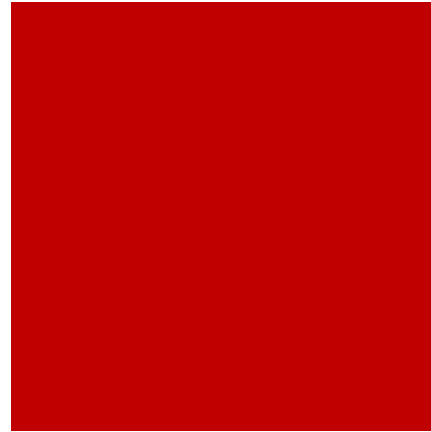




Session 2: Spice Up Your Diet!



Course: Nutrition and you: Function Foods

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+ Objectives

Students will be able to:

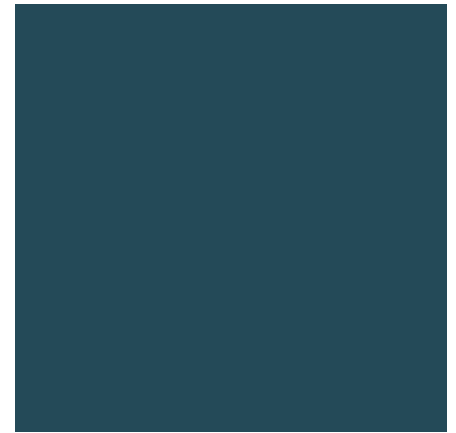
- Describe how herbs and spices are functional foods.
- Demonstrate understanding of how garlic works in disease prevention.
- State cinnamon's role in disease prevention.
- Provide practical tips for incorporating daily use of cinnamon into the diet.
- Discuss turmeric's potential effects in various disease states.
- Demonstrate understanding of the pharmacological actions of rosemary.



+ Outline

- Herbs and Spices as Functional Foods with a focus on:
 - Garlic
 - Cinnamon
 - Turmeric
 - Rosemary
 - Yogurt





Herbs and Spices as Functional Foods

+ Herbs & Spices as Functional Foods

- The growing use and marketing of herbs, either directly or as dietary supplements, has raised many scientific questions regarding their efficacy and safety
- Herbs have been used for medical benefit in nearly every culture on earth since ancient times
 - in Asia, Africa, Europe and the Americas



+ Herbs and Spices as Functional Foods

- Herbs may act in a pathway similar to pharmaceuticals, and if eaten as part of a normal, varied diet, may have fewer or no side effects than pharmaceuticals.
- Natural anti-inflammatory compounds abound in the herbal world and are found in **green tea and spices, such as turmeric, rosemary** and others.
- Because the use of non-steroidal anti-inflammatory drugs (NSAID) is associated with a reduced risk for several cancers, these herbs which may have natural anti-inflammatory properties are being researched for possible use as cancer preventives.

+ Spice Up Your Life!



- Many spices and herbs like oregano, turmeric, curry, cumin contain antioxidants that may help fight against heart disease and cancer
- Here's more ways to enjoy spices and herbs:
<http://melissashealthyliving.com/its-a-taste-party-with-herbs-and-spices-galore/>



Spice it up!



Garlic



Garlic

An Introduction



- Garlic (*allium sativum*) was one of the first plants to be cultivated by humans. Cultivation began 5,000 years ago in the Middle East.
- Garlic can be classified as a spice, herb or vegetable.
- Along with onions, leeks, shallots, and chives it is one of the major *Allium* species foods in our diet.
 - Other herbs or vegetables in this family do not have the same benefits as garlic, but they may have benefits of their own.
- Garlic is a rich sources of *allicin* and *diallyl sulfide*, which have tumor-fighting properties
- Health claims: garlic may reduce the risk of heart disease, cancer, benefit the immune system.

American Journal of Clinical Nutrition, Vol. 84, No. 5, 1027-1032, November 2006
American Cancer Society. *Complete Guide to Complementary & Alternative Cancer Therapies*.
Atlanta, GA: American Cancer Society; 2009.



Garlic



- Garlic is composed of a variety of complex chemicals that influence hormones, tumor cell growth, and blood vessel formation
 - Because of the number and complexity of chemicals in garlic, It is difficult to know which chemical components have health benefits.
 - Depending on the soil it is grown in, some garlic may be higher in the antioxidant selenium, which also has cancer-fighting properties.
- Early studies focused in on allicin, the compound that gives garlic its pungent taste and smell.
- Scientists think other sulfur compounds such as DADS, diallyl sulfide (DAS), and S-allylcystein (SAC, a unique compound found only in aged garlic extract) may also play a role in fighting disease.

+ Garlic:

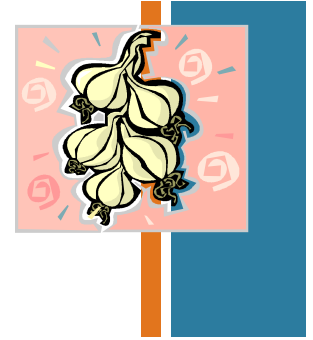
Fight off bacteria, viruses, and fungus



- Anti-bacteria
 - Crushed garlic has been shown to inhibit common bacteria such as *Escherichia*, *Salmonella*, *Staphylococcus*, *Streptococcus*, *Bacillus*, *Clostridium*.
 - Mainly due to the chemical component allicin.
- Anti-virus
 - In vitro and vivo study, several viruses such as influenza B, herpes simplex virus type 1&2, parainfluenza virus type 3 are sensitive to garlic.
- Anti-fungus
 - Allicin in garlic extracts inhibits the growth of fungus.

American Cancer Society. *Complete Guide to Complementary & Alternative Cancer Therapies*. Atlanta, GA: American Cancer Society; 2009, Ankri S. and Mirelman D. Antimicrobial properties of allicin from garlic. **Microbes and Infection**. 1999; 1(2):125-129

+ Garlic & Heart Health



- Hundreds of studies have looked at garlic's lipid-lowering effects and potential to prevent cardiovascular disease (CVD).
- Results have been mixed.
 - Some studies show large drops in cholesterol while others show no effects.
 - Garlic may inhibit clot formation, which could prevent heart attack and stroke.
 - It may reduce blood pressure by 7-8%.
- Recent reviews, including a report by the Federal Agency for Healthcare Research and Quality in 2000, found garlic does have modest short-term lipid-lowering effects for up to six months.
- If it does lower cholesterol it may be because the added flavor of garlic makes you less likely to go too heavy on the cheese!

+ Garlic & Heart Health



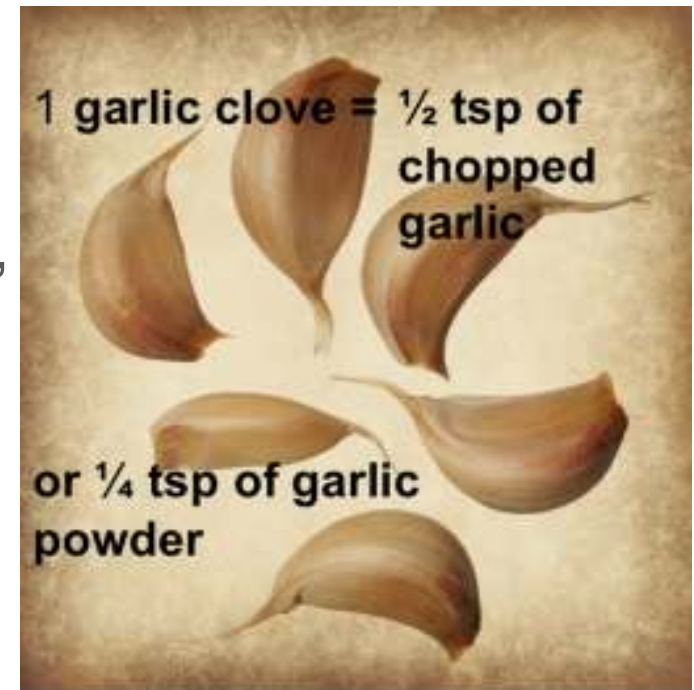
- German Commission E* and the World Health Organization:
 - Support the use of garlic as a preventative therapy for CVD and as an adjunct treatment, along with conventional medicine, for people with CVD.
 - Dose: 4 grams fresh garlic every day (one large clove per day).
 - See slide on Garlic: Risks.

*German Commission E is a governmental regulatory agency that was established in 1978 in Germany. It is composed of scientists, toxicologists, physicians, and pharmacists

+ Garlic and Cancer



- Epidemiological studies:
 - Several large population studies show garlic eaters have significantly lower rates of stomach, colon, and prostate cancer than non-garlic eaters – about half the risk for stomach and prostate cancer and one-third less risk for colorectal cancer



+ Garlic and Cancer

- Experimental studies:
 - In vitro studies suggest garlic reduces tumor growth and promotes apoptosis. **Apoptosis** is the death of the cancer cell.
 - Studies in laboratory animals indicate that garlic may have a protective effect against colon, skin, liver, and breast cancer.
 - There are few clinical trials in humans studying garlic and cancer. One Chinese study found that garlic extract and garlic oil did not prevent stomach cancer.
- More randomized clinical trials are needed to provide evidence of garlic's beneficial effects on cancer.



+ Garlic Risks



- Garlic breath, a strong taste, and stomach upset.
- The quantities typically consumed in the diet are likely safe. However, consult your doctor before beginning a garlic regimen if:
 - You are having surgery soon. It may interfere with anesthesia or other medicines. Garlic may increase the risk of bleeding.
 - You take warfarin (Coumadin) or aspirin. Although recent evidence suggests that garlic is safe to take with these medicines, discussing your plans with a doctor is the best policy.
 - If you are on any medications during pregnant or breastfeeding discuss potential drug/herb interactions

+ Garlic and Cooking

- Consider adding garlic when grilling or cooking meats at high temperatures:
 - Laboratory studies from Florida A&M University found diallyl sulfide, a flavor component of garlic, inhibits the effects of PhIP, a carcinogen produced when meat and eggs are cooked at high temperatures. PhIP is thought to stimulate the growth of human breast cancer cells.



+ Garlic



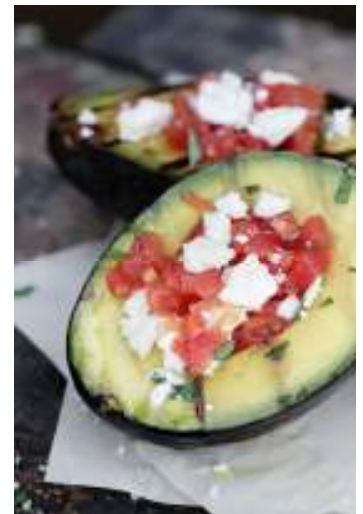
- Active ingredients can vary greatly in different garlic bulbs and cloves
- Similar to German Commission E recommendations, some researchers suggest eating 1-2 cloves of raw garlic daily (yielding 4,000-12,000 micrograms of allicin) to get the most health benefits.
- Cooked garlic is also effective
- One research study advises to peel garlic that is chopped or crushed and allowed to stand 10-15 minutes before you cook in order to retain it's possible anticancer properties
- Cooked garlic has less effect on platelets than fresh, so it may be less likely to interfere with blood-thinners

+ Garlic cooking tips



- Freshly chopped or minced garlic retains most of the allicin:
 - Sprinkle just like cheese onto pasta, casseroles, pizza and salad
 - Stir-fry with vegetables. The garlicky taste is so flavorful you can cut down on salt!
 - Mix into savory dips such as guacamole, hummus or Greek yogurt
 - Dress up salad with garlic added into vinaigrettes

Peeling tip for garlic: place garlic glove flat on cutting board, lay flat side of cutting knife on top of the garlic clove, use hand's heel to press the knife down. The skin easily comes off.



+ Interesting Fact

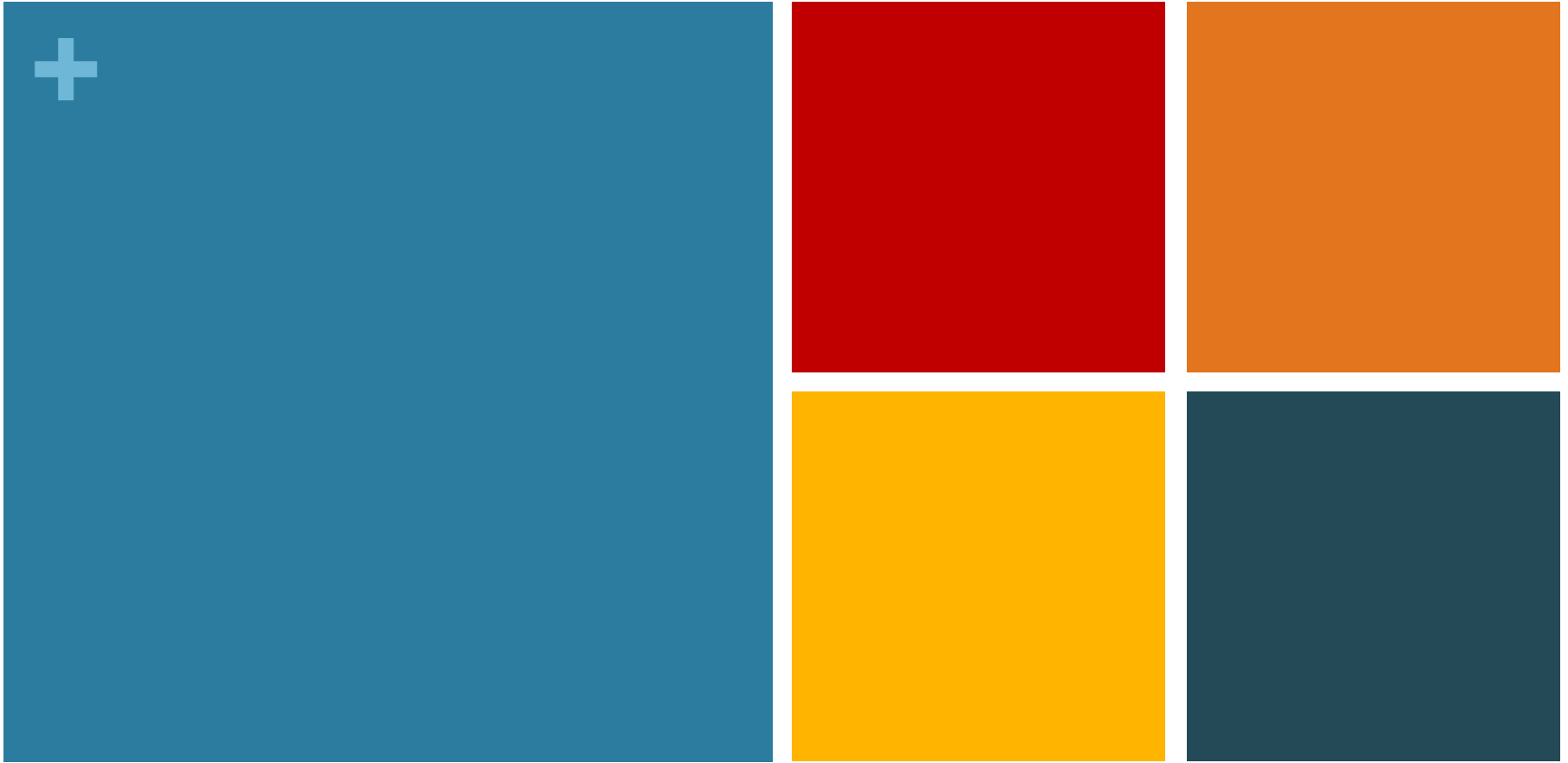


40 percent of food
produced in the U.S.
ends up in the
trashcan.

That's 141 trillion
uneaten calories,
\$165 billion lost.



SuperKidsNutrition.com



Cinnamon

+ Cinnamon



- Originates from bark trees native to China, India and Southeast Asia.
 - Used in cooking and traditional medicine in many cultures for centuries
 - Found in Mexican hot chocolate, Chinese five spice, German sauerbraten marinade, North Indian curries, and some Greek stews
- Sold as a powder, bark, bud, and oil, although in the U.S. buds are not generally available
- Cinnamaldehyde is the major constituent that gives the flavor of all cinnamon species.

+ Cassia vs Ceylon Cinnamon



- There are two main varieties commonly available of this spice:
 - **Ceylon cinnamon/true cinnamon (*cinnamomum zeylancium*)**
 - Distinctly different flavor than cassia. It more complex, subtle, and less sweet than cassia.
 - Light brown
 - Bark is rolled as thin multiple layers newspaper
 - Less cinnamaldehyde and coumarin than Cassia Cinnamon



Cassia vs Ceylon cinnamon



■ Cassia cinnamon

- Just as “real” as Ceylon cinnamon!
- Belongs to same family as Ceylon cinnamon, but different species
- Reddish brown to dark brown with pungent flavor like pepper
- Bark is rolled as hollow, thick layer
- Contains more cinnamaldehyde and coumarin than Ceylon cinnamon
- >90% of cinnamon imported to US in the past 5 years was Cassia from Indonesia because of its cheaper price
- Other names: cinnamomum cassia blume, Chinese cinnamon (*C. aromaticum*), Indonesian cinnamon (*C. burmannii*), Saigon cinnamon (*C. loureiroi* nees)

Wang Y.H., Avula B., Nanayakkara N.P.D. et al. Cassia cinnamon as a source of coumarin in cinnamon-flavored food and food supplements in the United States. *Journal of agricultural and food chemistry*. 2013; 61:4470-4476

+ Cinnamon Controversy

- Cinnamon has been studied for health benefits including its potential to lower glucose level, and its antibacterial, antifungal and anti-inflammatory properties.
- Recently, there has been increased public awareness that Cassia may damage the liver because it contains amounts of coumarin which cause hepatotoxic effects in animal models.
 - These animals developed tumors after lengthy exposures to coumarin.
- A small percentage of individuals may be genetically more susceptible to toxic effects of coumarin than others.

Abraham K, Wohrlin F, Lindtner O, Heinemeyer G, Lampen A. Toxicology and risk assessment of coumarin: focus on human data. *Molecular nutrition & food research*. Feb 2010;54(2):228-239.

+ Regulation of Coumarin



- Coumarin itself has a unique flavor described as fresh hay or vanilla.
- In the US, the FDA has banned coumarin as added ingredient to flavor foods. However, the FDA has not set a upper tolerable level
- European Food Safety Authority and German Federal Institute for Risk Assessment (BfR) set coumarin's tolerable daily intake as 0.1mg/kg Body Weight

+ How much Coumarin is in American Products?



- In 2013, Wang et al analyzed 40 commercial cinnamon barks and powders, and 21 food products. The researchers found:
 - “Ceylon cinnamon contains only trace of coumarin but cassia cinnamon especially *C. Burmannii* contains substantial amounts”
 - as >90% imported cinnamon was *C. burmannii*, researchers believed that there exists a substantial amount of coumarin in cinnamon-flavored food products.
 - Individuals sensitive to coumarin may have health risk if eating substantial amount of cinnamon every day.



All About Cinnamon



- **Anti-inflammatory and Anti-clotting**

- Heart disease, arthritis, asthma.....

- *The Science*

- Cinnamaldehyde: lowers the release of arachidonic acid, an inflammatory fatty acid, from platelet membranes
- With the release of arachidonic acid, formation of thromboxane A₂ is reduced which prevents platelets from clumping together and increasing clotting time



+ Ceylon Cinnamon and Rheumatoid Arthritis



- In a study conducted on rats, extracts from Ceylon cinnamon reduced inflammation and pain in induced rheumatoid arthritis.
- Rats who received the extract had significant decreases in blood levels of TNF-alpha, which is a central regulator of inflammation.
- The extract inhibited cytokine release *in vitro*.
- The study indicates that Ceylon cinnamon contains bioactive ingredients. Further research will show us what effects whole cinnamon as part of the diet will have on humans with RA.

Rathi B, Bodhankar S, Mohan V, Thakurdesai P. Ameliorative Effects of a Polyphenolic Fraction of *Cinnamomum zeylanicum* L. Bark in Animal Models of Inflammation and Arthritis. *Scientia pharmaceutica*. Jun 2013;81(2):567-589.

+ All about Cinnamon



■ Anti-bacteria and anti-fungus

- Laboratory tests found growth of yeasts and bacteria were stopped by cinnamaldehyde in cinnamon extracts

■ Active against Foodborne pathogenic bacteria

- Cinnamaldehyde and proanthocyanidins in *C. burmannii* contributed the most on killing five common foodborne bacteria: *Bacillus cereus*, *Listeria monocytogenes*, *Staphylococcus aureus*, *E. Coli* and *Salmonella anatum*.
- Cinnamaldehyde seems inhibit the growth of *E.coli*, *Salmonella* and *Clostridium botulinum* in common foods such as meats, apple juice and carrot juice.

+ All about Cinnamon



■ Active against *Candida albicans*

- Vaginal yeast infections, as well as thrush
- Improved symptoms of oral candidiasis in mice
- HIV patients had improvements in their oral candidiasis (yeast growth due to a compromise in the immune system, seen also in cancer patients)

■ Active against fungus

- Cinnamon oil with conc. >1% was excellent in controlling *A. flavus*, *P. expansum* and *R. nigricans*





Cinnamon: Diabetes



- Good source of chromium, an essential trace mineral required by the human body for normal carbohydrate metabolism
- However, research shows it is the other active components in cinnamon and not chromium which helps with better glucose control
- A study published in Horm Metab Res. in 2004 showed cinnamon can prevent insulin resistance induced by a high fructose diet in rats

+ Apple Pie & Diabetes?



- Investigation has found that apple pie did NOT cause the expected rise in blood glucose levels
- Further investigation revealed cinnamon in the pie was the likely protective factor.
- Polyphenolic polymers isolated from cinnamon were found to increase sugar metabolism



+ Apple Pie & Diabetes?

- The most active compounds were methyl hydroxyl chalcone polymers (MHCP) which increased glucose metabolism about 20-fold in vitro
- Again: Polyphenolic polymers isolated from cinnamon were found to increase sugar metabolism



+ Cinnamon: mechanism with diabetes

- Methyl Hydroxyl Chalcone Polymer (MHCP) was found to work synergistically with insulin to increase glycogen synthesis
- MHCP is capable of increasing cell uptake of glucose even in the absence of insulin
- All of these properties make cinnamon potentially beneficial for combating diabetes



+ Cinnamon: more studies on diabetes



- A RCT indicated that type 2 diabetes patients with usual care management experienced an 0.83% drop in HbA1C after ingesting 1 g cinnamon capsules (cinnamomum cassia) daily for 90 days.
 - 109 type 2 diabetes patients with HbA1C>7 from 3 primary care clinics at a US military base
 - HbA1C measured at baseline and 90 days
 - Only 1 person reported rashes while taking the capsules
 - Study suggests 1g (1/2 teaspoon) cinnamon is safe
 - Moreover, the reduction in HbA1C obtained in this study is meaningful and may improve risks of eye, nerve and heart disease in individuals with diabetes.

+ Cinnamon: more studies on diabetes

On the other hand:

- A crossover trial showed that patients with impaired glucose tolerance had no significant change in glucose and insulin responses in two OGTTs after ingesting 6 g of Ceylon cinnamon.
- A systematic review revealed that *C. cassia* at a mean dose of 2 g daily for a period ranging from 4 to 16 weeks as their treatment on type 2 and type 1 diabetes patients has inconclusive results on fasting blood glucose and insignificant changes on HbA1C.



+ Cinnamon: Pakistani study



- Research: Numerous animal and cell culture studies showed encouraging results
 - Volunteers, 60 Pakistani men and women, aged 40 to 65, with type 2 diabetes
 - received 1, 3, or 6 grams per day of cassia cinnamon lowered their blood sugar levels by 18% to 29%
- *Findings were based on a relatively small group, the results were encouraging since positive results are shown with low doses of cinnamon*

+ Cinnamon: Pakistan study

- Insulin activity is closely involved with lipid metabolism, another major concern for diabetics
- Individuals who took cinnamon supplements in the Pakistani study experienced improved glucose and lipid metabolism benefits



+ Cinnamon: Results from Pakistan study



- Decreases:
 - Triglycerides: 23% to 30%
 - Total cholesterol: 12% to 26%
 - LDL cholesterol: 7% to 27%
- Changes in HDL cholesterol were inconsistent



+ Cinnamon and Diabetes: Bottom Line



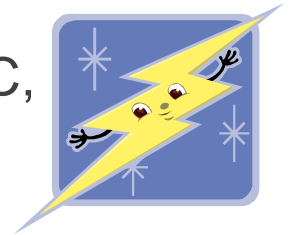
- Recent studies showed conflicting evidence of cinnamon on diabetes. Nothing is a cure all –so cinnamon may help but good blood glucose control is about exercise and eating right!
- Most of the research has shown benefits from Cassia cinnamon but not Ceylon cinnamon.
- Some researchers suggested that coumarin is contributing to the lowering of the blood glucose level.
- But the coumarin content is substantial in cassia cinnamon, it might be inappropriate to recommend patients with diabetes to supplement their diet with large dose of cassia cinnamon. Daily use is good – don't go overboard!
- Further research is needed.

+ Antioxidant Power of Cinnamon



The Science

- Reduced antioxidant activity with diabetes. This is a major contributor of vascular disease
- Antioxidant activity good or better when compared to vitamin C, cystein, glutathione, and carotene
- Studies indicate: antioxidant protection occurs by the ability of cinnamon to activate antioxidant enzymes





Antioxidant Power of Cinnamon



- Interact with proteins that regulate growth-promoting signals suppressing growth of tumor cells in culture
- Cassia cinnamon is Generally Recognized as Safe (GRAS) when consumed in amounts normally found in food

+ Antioxidant Power of Cinnamon



- More isn't always better!
- For all spices and herbs there may be tolerable upper limits
- Going out and buying cinnamon capsules is NOT advised
- Follow recommend amounts to include in your diet – 1/2 to 1 tsp of cinnamon a day.

+

**1/2 tsp of
cinnamon
per day**



+ Cinnamon: How to Use It

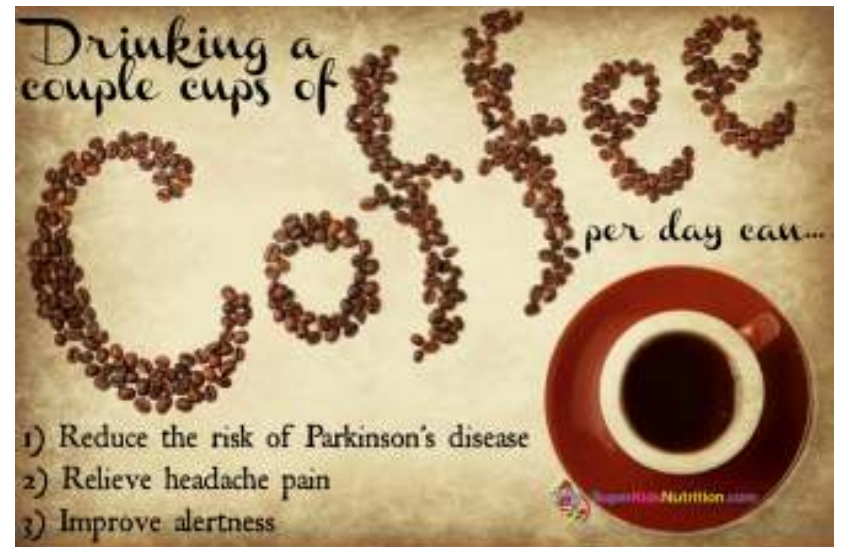


- Sprinkle:
 - On your cereal or oatmeal
 - Over plain cheerios as a snack
 - In low fat ricotta cheese with jam then spread on whole grain toast
 - In coffee or tea
 - On toast with healthy butter substitute, real butter in moderation, reduced fat cream cheese, or oil.



+ Cinnamon: How to Use It

- Mix it in:
 - Brown rice, whole grain couscous, barley or quinoa (pronounced qeen-wa) with raisins, currants and sliced toasted almonds (learn more about ancient grains like quinoa: <http://melissashealthyliving.com/ancient-grains-grain-goodness/>)
 - Low fat yogurt
 - Berries or fruit salad
 - Apple slices, heated in the microwave
 - Orange slices or Orange Juice
 - Hot chocolate or coffee



+ Cinnamon and Children



- In some countries, children chew on cinnamon sticks for a special treat
- Ceylon cinnamon can be encouraged for its health benefits at an early age
- A recent article from the Journal of American Dietetic Association states that herbs and spices aren't common allergens and may be added in moderation to small children
 - If you customarily add spices to your family meals, feel comfortable sharing those foods with children the early stages of food introduction, typically after the child is a year old. However, avoid cooking with additional salt when possible.

+ Purchasing and Storage



- Freshness of:
 - Ground cinnamon: 6 mo – 1 year
 - Sticks: 1 year
- Buy small quantities.
- Keep in a cool, dry, and dark place. Refrigeration can extend shelf life.
- Check out this article on cinnamon:
<http://www.superkidsnutrition.com/nutrition-articles/the-truth-about-cinnamon/>

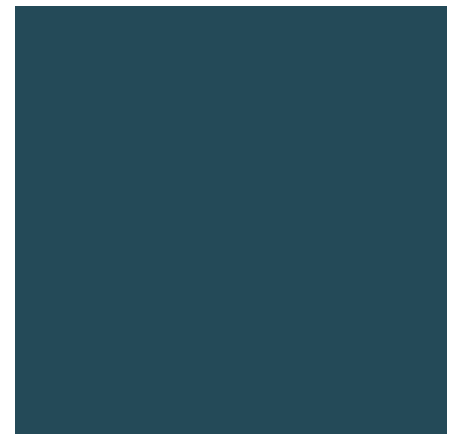
+ Fun Fact!

Just just two teaspoons of dried oregano leaves have antioxidants two times higher than a medium size Fuji apple

Grow your
own cancer
fighters!



MelissasHealthyLiving.com



Turmeric

+ Turmeric



- A member of the ginger family, turmeric has a mustard yellow-orange color.
- It can be used alone, or as an ingredient of curry powder.
- In Asia, turmeric has been used as a traditional remedy for the treatment of inflammation and other diseases for generations.
 - It has been used to treat biliary disorders, anorexia, herpes zoster, acne, urinary tract diseases, diabetic wounds, hepatic disorder, rheumatism and sinusitis and others.
- Turmeric and sugar mixed with hot water has been traditionally used to treat the common cold.
- Turmeric may also be used to add color to food, textiles, or cosmetics.

+ Turmeric and Curcumin

- Curcumin, the active ingredient in turmeric, has been studied more than turmeric as a whole herb.
- Dried root of turmeric contains from 3-5 percent curcumin.
 - It is estimated that the average intake in the Indian diet is 60-100mg curcumin daily (2-2.5g of turmeric).
- The benefits of an isolated extract of curcumin may not have the same effects as turmeric when used as a whole herb.
- On the other hand, herbs, spices and food function synergistically, so that the health benefit of eating whole spices and foods as part of normal diet may be greater than the effect of an isolated ingredient.
 - One study indicated that bioavailability of curcumin, normally poor, was enhanced by piperine, the active ingredient of black pepper.



+ Turmeric

- Curcumin displays in vitro (artificial like in a test tube) and in vivo (in living organisms) effects.
 - Antioxidative
 - Anticarcinogenic
 - Hypocholesterolemic activities
 - Very strong immunomodulator (alters the immune response)
 - Antiviral
 - Antimicrobial
- In other words, in laboratory dishes, curcumin can kill cancer cells and slow growth of surviving cells. Similar effects have been observed in animal studies.

Garcia-Nino WR, Pedraza-Chaverri J. Protective effect of curcumin against heavy metals-induced liver damage. *Food and chemical toxicology : an international journal published for the British Industrial Biological Research Association*. Apr 18 2014.

+ Curcumin

- Despite its poor bioavailability, curcumin has demonstrated potential to treat these human diseases in clinical trials:
 - Cancer
 - Diabetes
 - Alzheimer's disease
 - Inflammatory bowel disease
 - Rheumatoid arthritis
 - Osteoarthritis
 - High cholesterol
 - Liver injury
 - Atopic asthma
 - HIV
 - Psoriasis
 - Cystic fibrosis

García-Niño, W.R., Pedraza-Chaverri, J. Protective effect of curcumin against heavy metals-induced liver damage. Food Chem. Toxicol. (2014)



+ Curcumin & Alzheimer's



- Curcumin inhibits expression of inflammatory cytokines involved in many disease processes
- Curcumin's multiple anti-amyloid activities may contribute to the suppression of amyloid in vivo and its anti-amyloid activities remains effective in aged mice and **after amyloid deposits are well-established**
- May help with prevention & treatment



+ Curcumin and Heavy Metals

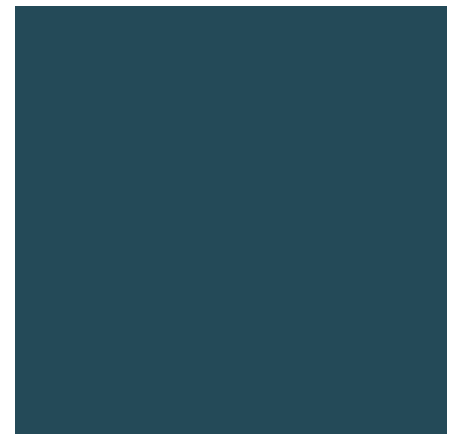


- Curcumin is being studied for its potential to protect the liver against the toxic effect of heavy metals, such as arsenic, lead, and mercury.
 - The antioxidant, anti-inflammatory, anti-fibrogenic and anti-carcinogenic properties of curcumin are all proposed to exert a beneficial effect in the case of people who, through occupational or environmental exposure, have heavy metals in their bodies.
 - Specifically, it is the ability of curcumin to scavenge free radicals, act as a chelating agent, induce detoxifying enzymes, and down-regulate proinflammatory cytokines that make the chemical potentially effective at preventing the poisonous effects of these metals.

+ Turmeric

Dosage

- According to the American Cancer Society, there is not one standard recommended dose, however **one teaspoon turmeric with each meal** is one possible recommendation that will add the color of sunshine and a warm, mild fragrance to your meals!
- Turmeric is considered safe in the quantities typically eaten as food.
- Larger amounts and supplements have risks for certain groups, including those susceptible to kidney stones, or those taking certain medications. As always, consult a doctor before beginning a supplement of turmeric or curcumin.
- Golden Milk (add turmeric to milk), Tea or Applesauce –add a tsp of turmeric
- Add to rice or quinoa dishes, sweet potatoes, potatoes, chicken and curry dishes



Rosemary

+ Rosemary

- Member of the Labiate Family (Lamaiceae)
- Active components: phenolic diterpenes and triterpenes: caffeic acid, rosmarinic acid, ursolic acid, carnosic acid, and carnosol.
 - These compounds have strong antioxidant effects, especially the last two.
- Traditionally used for respiratory disorders and stimulating hair growth.



Ngo SN, Williams DB, Head RJ. Rosemary and cancer prevention: preclinical perspectives. *Critical reviews in food science and nutrition*. Dec 2011;51(10):946-954.

+ Rosemary



- Currently being researched for potential health benefit in these health conditions:
 - Asthma, spasmogenic disorders, peptic ulcer, inflammatory diseases, hepatotoxicity, atherosclerosis, ischemic heart disease, cataract, and poor sperm motility.
- Most research to date has been in vitro and animal studies.

Ngo SN, Williams DB, Head RJ. Rosemary and cancer prevention: preclinical perspectives. *Critical reviews in food science and nutrition*. Dec 2011;51(10):946-954.

+ Rosemary and Cancer



■ Anti-tumorigenic effects

- The Science: Extracts of leaves exhibit an inhibitory activity **against Killer B cells**, an assay which is used to identify anticancer agents in natural products
- Rosemary extract inhibits chemically induced mammary tumorigenesis in female rats and prevents carcinogen-DNA adduct formation in mammary epithelial cells
- Dietary supplement w/ 1% rosemary extract in rats treated w/ 7,12-dimethylbenzanthracene (DMBA, a cancer causing substance) significantly decreased the mammary tumorigenesis by 47% and inhibited total in vivo binding of DMBA to mammary epithelial cell DNA by an average of 42%

+ Rosemary and Cancer

- A review of studies on cancer and rosemary, primarily conducted in animals, concluded that extract of rosemary, similar to isolated carnosol, and carnosic acid, has anti-cancer effects that are not specific to any one tissue or species.
 - The extract inhibited growth of cancer cells in breast, liver, stomach, melanoma, and leukemia cells in humans and rodents.
- Data from 36 studies indicates that rosemary's effects on cancer are due to the following mechanisms:
 - It initiates apoptosis or carcinogen metabolising enzymes
 - Or inhibits cell growth and proliferation, DNA adduct/free radical formation, carcinogen activating enzymes, lipid peroxidation.

Ngo SN, Williams DB, Head RJ. Rosemary and cancer prevention: preclinical perspectives. *Critical reviews in food science and nutrition*. Dec 2011;51(10):946-954.

+ Pharmacological Actions of Rosemary



- **Effects of rosemary on the central nervous system:**
 - Administration of rosemary oil both by inhalation and oral – stimulates the CNS, respiratory, and locomotor activity in mice
- **Effects of rosemary on the skin:**
 - Stimulates the skin, improves circulation and improves hemodynamics (how blood flows through the body) in occlusive arterial diseases

+ Rosemary



- **Effects of rosemary on the smooth muscle:**
 - The oil inhibited the contraction of the tracheal smooth muscle induced by acetylcholine and histamine in rabbits and guinea pigs in CA^{2+} containing and CA^{2+} free solutions
 - Some cultures consume more rosemary during respiratory illness or with asthma



+ Rosemary



- **Antimycotic (antifungal) activity of rosemary**
- Rosemary oil inhibited the growth of *Candida albicans* in vitro
- In vivo: when an aqueous emulsion of rosemary oil in water is applied with a cotton swab in the mouth, 5 x a day, in patients with different types of cancer and pneumonia having candidiasis which did not respond to treatment with nystatin, the growth of the yeast disappeared completely in 2-4 days

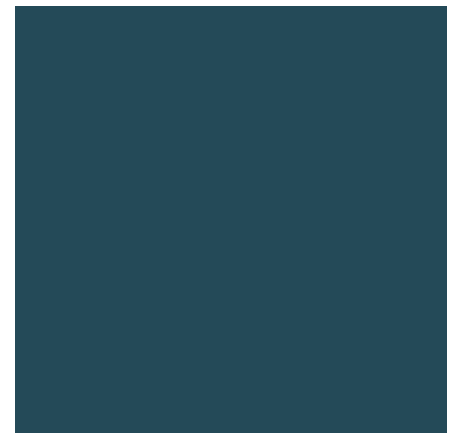
+ Rosemary



- **Choleretic (an agent that stimulates the liver to produce more bile) and hepaprotective (refers to protecting the liver) effects of rosemary.**
 - Used lyophilized ethanol and aqueous extracts of young sprouts of *R. officinalis* – shown a choleretic activity and offered protection against carbon tetrachloride induced hepatotoxicity in rats
 - There was a significant increase in bile flow and a significant reduction in plasma liver enzymes when extracts were given as a pretreatment before carbon tetrachloride

+ Rosemary

- These findings suggest that the use of rosemary extract and its individual antioxidant constituents as chemopreventative agents for tumorigenesis is promising.
- Try to include rosemary when cooking, add it to chicken, fish and bean dishes.
- Consider adding more to your diet, perhaps added to tea if you have a cold or respiratory illness.
- It's important to remember it is not be used as a medicine but as a functional food.
- My favorite way to eat rosemary is with polenta:
<http://melissashealthyliving.com/easy-polenta-rounds/>



Other Herbs and Spices

+ Peppermint Irritable Bowel Syndrome



- Peppermint tea has traditionally been used to treat biliary disorders, indigestion, enteritis, gas, gastritis, intestinal colic, GI tract spasms.
- Peppermint oil has received attention for its ability to treat Irritable Bowel Syndrome (IBS). IBS is a disorder that affects the colon. Symptoms include abdominal pain, cramping, bloating, constipation, and diarrhea.

McKay DL, Blumberg JB. A review of the bioactivity and potential health benefits of peppermint tea (*Mentha piperita* L.). *Phytotherapy research : PTR*. Aug 2006;20(8):619-633.

+ Peppermint

Irritable bowel syndrome



- A review of 9 studies found that peppermint oil is an effective treatment for IBS, and has few side effects.
 - Treatment with peppermint oil relieved abdominal pain.
 - These studies used enteric-coated prepared peppermint oil capsules. One regimen found to be effective was a capsule containing 0.2ml peppermint oil, 3 times per day, 30 minutes before a meal, for 8 weeks.
 - Peppermint leaf tea contains peppermint oil, but the amount of peppermint oil in tea is likely to be widely variable.
 - **Risks:** Peppermint aggravates GERD. Not recommended in pregnancy.

Merat S, Khalili S, Mostajabi P, Ghorbani A, Ansari R, Malekzadeh R. The effect of enteric-coated, delayed-release peppermint oil on irritable bowel syndrome. *Digestive diseases and sciences*. May 2010;55(5):1385-1390.

+ Peppermint



- Peppermint is also being studied for its antitumor, antiallergenic, antimicrobial, and antioxidant capabilities.
- The German Commission E approved the use of peppermint leaf as a medicinal tea for the therapeutic treatment of indigestion.
 - Recommended dose is 3-6g leaf for infusions.

+ Ginger

Nausea and Vomiting

- Ginger is often the go-to spice for nausea and vomiting relief.
- Clinical studies have demonstrated the potential of ginger to treat nausea and vomiting during pregnancy, motion sickness, after surgery, and during chemotherapy.
- Ginger is theorized to be effective because it targets 5-HT₃ receptors, which have a major role in nausea and vomiting induced by surgery and chemotherapy.
- Ginger may also be effective in relieving symptoms of IBS.
 - It is hypothesized that a compound in ginger called 6-gingerol targets the 5-HT₃ receptors, inhibiting neurons in the gut, leading to a less excitable bowel.

J Walstab et al. Ginger and its pungent constituents non-competitively inhibit activation of human recombinant and native 5-HT₃ receptors of enteric neurons. *Neurogastroenterology Motil.* 2013;25: 439-e302.

+ Ginger

- Ginger may also decrease inflammation and animal studies suggest it may have a protective effect on blood lipids.
- In addition, it serves as an antimicrobial, anti-migraine, and anti-thrombotic, and may help maintain a healthy immune system.

Adv Pharm Bull. 2013;3(2):273-6.
Food Chem Toxicol. 2008;46(2):409-420.



+ Ginger Risks

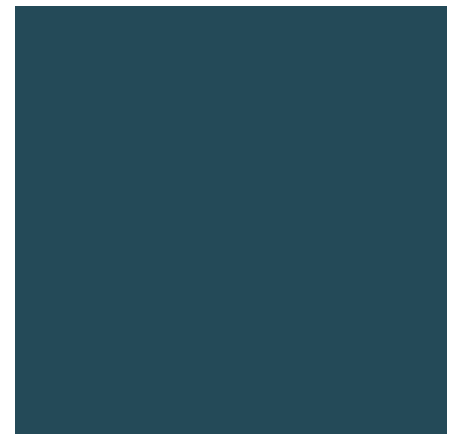
- Despite being a frequently recommended herb for use during pregnancy for morning sickness, there are some concerns about the long term safety of this herb during pregnancy. It may interfere with blood clotting.
- Always discuss any herb regimen with your doctor.



+ Ginger

- Dose: There is a wide range of suggested doses. For treatment of nausea, a common suggested dose is 250 mg to 1 g of powdered ginger taken with liquid several times per day.
- Avoid sugary ginger ale!
 - These drinks are often too high in sugar to be beneficial, and the amount of real ginger they contain is unknown. Some brands use artificial flavoring, not real ginger.
- Try fresh grated ginger in tea, smoothies:
<http://melissashealthyliving.com/refreshing-green-smoothie-a-bone-booster/> or added to tofu or Chinese dishes:
<http://melissashealthyliving.com/an-easy-chinese-meal-to-cook-with-your-kids/> or soups: <http://melissashealthyliving.com/root-vegetable-recipe-sweet-potatoes-and-carrot-soup/>





Yogurt

+ Yogurt



Probiotic Bacteria

- The live cultures that turn milk into yogurt provide health benefits:
 - Improve digestion by adding good bacteria such as *Lactobacillus acidophilus* and *Streptococcus thermophilus* and crowding out bad bacteria
 - May be helpful in managing diarrhea, inflammatory bowel disease, irritable bowel syndrome, and possibly chronic infection with ulcer causing bacterium *Helicobacter pylori*
 - Help prevent urinary tract infections & keep bad breath at bay
 - May help lower cholesterol & control constipation and diarrhea
- Yogurt, Greek yogurt, kefir, buttermilk all contain probiotics.

+Yogurt

- In addition to the beneficial bacteria, 1 cup of yogurt is also an excellent source (contains more than 20% daily value) of:
 - Calcium
 - Protein
- Like other dairy products, yogurt contains conjugated linoleic acid, which may have a protective effect against breast cancer.
- Yogurt may also be a source of vitamin D if it is fortified, check the label to find out.
- Great substitute for milk for someone with lactose intolerance.
- Greek yogurt is delicious added to soups!



+ Yogurt



- Many flavored yogurts are packed with sugar, artificial flavors and colors.
- Currently, the nutrition facts label on yogurt does not distinguish between added and milk sugar (lactose).
 - Lactose is absorbed slower than glucose and fructose, and does not cause a sharp increase in blood glucose levels like sweeteners.
 - 8 ounces of plain, unsweetened yogurt has around 15 grams of milk sugar.
 - 8 ounces of plain, unsweetened Greek yogurt has about 6 grams of milk sugar.
 - One teaspoon of sugar equals 4 grams.
 - Thus, an 8 ounce yogurt that contains 24 grams of sugar, has 2 teaspoons of added table sugar. The remaining sugar is milk sugar.
- Read the nutrition facts and be aware of the added table sugar. It adds up quickly. Choose yogurt that contains 15g of sugar per serving or less.
- Also choose yogurts with additives such as guar gum, BHT, corn or modified food starch or any other fillers.

+ Yogurt



- The FDA has proposed a new format for nutrition facts labels that will clearly identify how many grams of added sugar is in a product, such as yogurt.
 - For more information and updates see fda.gov and search for “Nutrition Facts Label”.
- If a yogurt is flavored with real fruit, it has a nutrition advantage due to the vitamins and phytonutrients present in the fruit.
 - Buy plain yogurt and sweeten it with fruit.
 - Try buying frozen fruit and heating it. It will taste sweeter when added to plain yogurt.
- Unless the sweetener has some nutritional value, such as fruit, whether it is a natural sugar, such as maple syrup, or refined sugar won't make a huge amount of difference health-wise.
- Choose the brand with less added sugar that you like the best!

+ Greek Yogurt

Weight Control



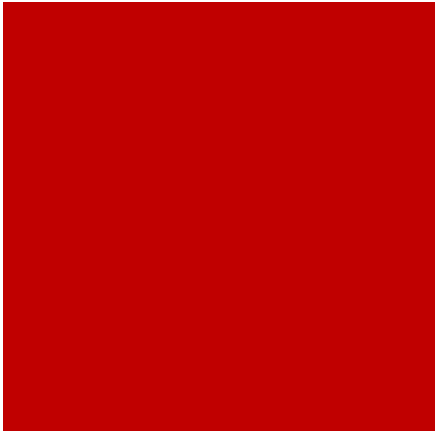
- Greek yogurt has exploded in popularity in the last several years.
- On average it contains 2 to 2 ½ times the protein as regular yogurt.
- One study found that women who ate Greek yogurt as part of a snack containing 24g of protein experienced less afternoon hunger, increased fullness, and increased the time to the next meal.

Douglas SM, Ortinau LC, Hoertel HA, Leidy HJ. Low, moderate, or high protein yogurt snacks on appetite control and subsequent eating in healthy women. *Appetite*. Jan 2013;60(1):117-122.

+ Food Yogurt Tips

- Add Greek yogurt to replace sour cream in mashed sweet potatoes:
<http://www.thekidscookmonday.org/2011/12/26/cinnamon-sweet-potato-mash/> or mashed potatoes
- Mix ½ sweetened yogurt with ½ low fat plain to decrease sugar content
- Mix microwaved cherries or berries and add to plain low fat yogurt, include 6 walnuts for some healthy fat
- Freeze yogurt and eat it like ice cream
- Sprinkle granola on top and eat it as a dessert





Thank You!!