Food Safety

Foods are becoming more highly processed and are increasingly treated with pesticides. Because of this, food safety is becoming an important health issue. This handout will give you some do's and don'ts of food safety.

Basic Food Safety Rules

1. Buy produce that is free of pesticides. Especially buy organic fruits and vegetables if they are on the "Dirty Dozen" list below.[1]
2. Buy meat and dairy products that are from grass-fed/grass-finished, hormone-free cattle. Buy poultry that is free of antibiotics and chemicals. Avoid all processed meats (hot dogs, deli meats).
3. Avoid charred, smoked, and pickled foods. They can contain high amounts of carcinogens (cancer-causing chemicals).
4. Avoid plastic bottles and food packaging that contains No. 3, 6, and 7 plastic.
5. Eat few processed and refined foods, fast take-out food, and foods containing trans fat. (Trans fats are formed when liquid fats are turned into solid fats by adding hydrogen. This is often done to lengthen the shelf life of food products.)

Dirty Dozen[1] (Buy these organic)	Clean 15 (Lowest in pesticides)
1. Apples	1. Onions
2. Celery	2. Corn
3. Strawberries	3. Pineapples
4. Peaches	4. Avocado
5. Spinach	5. Asparagus
6. Nectarines – imported	6. Sweet peas
7. Grapes – imported	7. Mangoes
8. Sweet bell peppers	8. Eggplant
9. Potatoes	9. Cantaloupe – domestic
10. Blueberries – domestic	10. Kiwi
11. Lettuce	11. Cabbage
12. Kale/collard greens	12. Watermelon
	13. Sweet potatoes
	14. Grapefruit
	15. Mushrooms

Pesticides in Produce

It is very important to have a well-balanced diet that includes 7 to 9 servings of fruit and vegetables a day. Unfortunately, most produce contains small amounts of pesticides even though it has been tested by the United States Department of Agriculture (USDA). Troubling news has come from research that studied the effects of insecticides used on plants that are later eaten. The studies have found that this food can affect the development of children's brains. The good news is that you can lower the amount

of pesticide taken into the body by buying the 12 most contaminated fruits and vegetables as organic. (See the "Dirty Dozen" list on page 1). This is especially important if you are pregnant, breastfeeding, or feeding young children. (The USDA certifies food as "organic" when it is produced without synthetic chemicals or fertilizers, genetic engineering, radiation or sewage sludge.)

A way to remember when to buy organic is by the thickness of the skin. The thinner the skin (e.g., berries, apples), the more likely it is that pesticides have soaked through. Thicker skinned produce (e.g., oranges, avocados) usually block chemicals from entering the food. If you wash fruits and vegetables for 30 seconds, you can greatly decrease the amount of pesticides on their surface. However, some amount may have already soaked into the food before washing.

For more information on pesticides, visit the following websites:

- Environmental Working Group: http://www.ewg.org
- United States Environmental Protection Agency (EPA) on Pesticides & Chemicals: http://www.epa.gov/gateway/learn/pestchemtox.html
- Pesticide Action Network Database to search pesticides: http://www.pesticideinfo.org/
- USDA's National Organic Program: http://www.ams.usda.gov/AMSv1.0/nop

Fish and Shellfish Safety

Fish and shellfish contain high-quality protein, are low in saturated fat, and contain omega-3 fatty acids. (See our handout: Omega-3 Fatty Acids). These are all good things.

1. The biggest concern about fish and shellfish is the level of pollutants and chemicals they contain, especially mercury. High levels of mercury are toxic to the brain and nervous system. It is important to avoid seafood with high levels of mercury during pregnancy, breastfeeding, and in small children. This will help to prevent problems with the development of the brain and spinal cord. Follow these rules from the EPA when eating fish:[2]
   - Do **not** eat shark, swordfish, king mackerel, or tilefish. They contain high levels of mercury.
   - Eat up to 12 ounces (2 average meals) a week of a variety of fish and shellfish that are lower in mercury.
   - Five of the most commonly eaten fish **low** in mercury are shrimp, canned light tuna, salmon, pollock, and catfish.
   - Another commonly eaten fish, albacore ("white") tuna, is high in mercury. Don't eat more than 6 ounces per week.
   - Check local advisories about the safety of fish caught by family and friends in your local lakes, rivers, and coastal areas. If no advice is available, eat up to 6 ounces per week of fish caught locally. Don't eat any other fish during that week.

2. The second concern is the difference between farm-raised and wild-caught salmon. Wild-caught salmon contain a higher content of omega-3 fatty acids than farm-raised salmon. Farm-raised salmon is also more prone to parasites and disease, fed antibiotics, and dyed artificially. So it is best to eat wild-caught salmon when possible.

3. The final consideration is to choose fish that were caught sustainably. Today, 80% of the world's sources of seafood are fully fished, over-exploited, depleted, or recovering from depletion. More and more people are eating seafood. It's critical that sustainable fishing practices are followed if wild-caught seafood is going to be available in the future. You can ask your local store more about this.

For more information on fish and shellfish safety, you can visit the following websites:

- EPA on Mercury in Fish and Shellfish: http://water.epa.gov/scitech/swguidance/fishshellfish/outreach/advice_index.cfm
- FDA Table of Mercury Concentration in Fish and Shellfish: http://www.fda.gov/Food/FoodSafety/Product-SpecificInformation/Seafood/FoodbornePathogensContaminants/Methylmercury/ucm115644.htm
- Up to date information on Sustainable Fishing from the Monterey Bay Aquarium: http://www.montereybayaquarium.org/cr/seafoodwatch.aspx.

Meat and Poultry Safety

Although you can get protein from other sources (e.g., soy, legumes, dairy), meat has become a part of most people's diet in America. If you eat meat and poultry, these guidelines will help you do so in the healthiest way possible

1. Buy beef that is antibiotic-free and hormone-free. The antibiotics in beef may make some harmful bacteria hard to treat with medications. Hormones in beef can increase the risk of developing some long-term health conditions.
2. Choose "grass-fed" and "grass-finished" beef as the meat is leaner. "Grass-fed" means that 95% of the cattle's diet is grass. "Grass-finished" means that 100% of the cattle's diet is grass.
3. Avoid all processed meat (hot dogs, sausage, cold cuts). They contain additives that may cause cancer.
4. Data from two large studies suggests that each additional daily serving of unprocessed red meat (e.g., beef, lamb or pork), about the size of a deck of cards, raises the risk of dying by 13%. A serving of processed meat (e.g., bacon, hot dog, sausage) increases the risk of death by 20%. Eating any kind of red meat increased the chances of dying from heart disease by 16% and from cancer by 10%. Processed red meat raised the risk of heart disease death by 21% and cancer death by 16%.[3] [Note: these are statistics for large numbers of people studied over time. It does not mean that if you eat a serving of meat today, that your chance of dying tomorrow is greatly increased. Instead, it suggests that you may be healthier for a longer length of time if you limit the amount of red meat that you eat.]
5. If you replace one daily serving of red meat with fish, poultry, nuts, legumes, whole grains, or low-fat dairy products, study results suggest the risk of dying can be reduced by 7% to 19%.[3]
6. Avoid charring (blackening) meats when cooking them. It produces cancer-causing chemicals on the surface of the meat. This can be reduced by cooking meat below 212^{o}F or microwaving meat before cooking it.
7. Hormones are not allowed in poultry. However, poultry can contain antibiotics, so look for poultry that is antibiotic-free.

"Organic" or "natural" cattle and chickens are raised in a healthier environment. They are fed organic feed and often eat a wider range of nutrients than those raised in factory farms. Organic feed does not contain ground up animal parts. There is little or no use of synthetic pesticides or chemicals in the food or on the land. Organic agriculture balances the soil in healthy ways. Crop rotation and other natural techniques are used to improve soil fertility, instead of chemicals. The animals are not fed food containing pesticides. So, the amount of pesticides in their meat is reduced. Organic farms use natural ways to solve pest problems. They also use less energy. Buying animal products from local farms further reduces energy by reducing the amount of miles the food travels to your table.

For more information on meat and poultry safety, please visit the following website by the USDA: http://www.fsis.usda.gov/Factsheets/Meat_&_Poultry_Labeling_Terms/index.asp

Raw Milk

Drinking raw milk and eating products made from raw milk are currently controversial. They can result in serious health risks from bacteria (i.e., *Salmonella*, *Escherichia coli* O157, *Campylobacter*), parasites, and viruses. To prevent this, raw milk is pasteurized, which involves heating to kill these germs. This affects some of the vitamins found in milk including thiamine, vitamin B12, and vitamin C. Yet milk is only a minor source of these vitamins. Pasteurizing milk has not been proven to contribute to asthma, allergies, or chronic disease, although there is limited research. Raw milk, if not old, can be better tolerated by some people. Raw milk contains enzymes and healthy bacteria that help break down the protein, since the milk is not pasteurized. This often allows people to drink this type of milk when they may not be able to drink pasteurized milk without uncomfortable symptoms. Unfortunately, tests by raw milk producers do not guarantee that it is safe to drink. If you wish to drink raw milk, make sure that you are familiar with the farm where you will buy it. Ask about the safety precautions they take. How often do they test the raw milk? How careful are they when they do the testing? Aged cheeses made from raw milk are generally okay to eat. Bacteria usually die off during the aging process.

For more information on raw milk, you can visit the following websites:

- Centers for Disease Control and Prevention (CDC) for their stance against raw milk: http://www.cdc.gov/foodsafety/rawmilk/raw-milk-index.html
- Advocacy site in favor of raw milk: http://www.rawmilk.org

Plastic Bottles and Food Packaging

Plastic bottles and food containers can contain chemicals that leach into the food, especially when heated. It is recommended that you store water and other fluids in a glass, aluminum, or bisphenol-A-free (BPA-free) plastic bottle. Additionally, avoid using, heating and reusing plastic containers with the recycle code number 3 (polyvinyl chloride), 6 (polystyrene), and 7 (polycarbonate, i.e. BPA). See the chart on page 5 for more detailed information.

Plastic #	Type of Plastic	Products Containing It	Safety	Evidence
1	Polyethylene terephthalate (PET or PETE)	Soft drink, water, sports drink, juice, ketchup, salad dressing, and mouthwash bottles; and peanut butter, pickle, jelly and jam jars.	**GOOD**	Not known to leach any chemicals that are suspected of causing cancer or disrupting hormones. Do not reuse as they harbor bacteria that are difficult to wash out.
2	High density polyethylene (HDPE)	Milk, water, and juice bottles; shampoo and detergent bottles; yogurt and margarine tubs; cereal box liners; and grocery, trash, and retail bags.	**GOOD**	Not known to leach any chemicals that are suspected of causing cancer or disrupting hormones.
3	Polyvinyl chloride (V or PVC)	Most cling-wrapped meats, cheeses, and other foods sold in delicatessens and groceries are wrapped in PVC. Reynolds wrap; packaged food trays; cooking oil bottles; plumbing materials; and medical tubing and bags.	**BAD**	Traces of these chemicals can leach out when in contact with foods. Di-2-ethylhexyl phthalate (DEHP) in PVC is suspected of causing cancer. Contains phthalates which disrupt hormones. Phthalates release dioxin during manufacturing and burning—known to cause cancer and disrupt hormones.
4	Low-density polyethylene (LDPE)	Some bread and frozen food bags; squeezable bottles; cling wraps; garbage and grocery bags; coatings for milk cartons and hot beverage cups.	**OK**	Not known to leach any chemicals that are suspected of causing cancer or disrupting hormones, but not as widely recycled as #1 or #2.
5	Polypropylene (PP)	Some ketchup bottles and yogurt and margarine tubs.	**OK**	Hazardous during production, but not known to leach any chemicals suspected of causing cancer or disrupting hormones. Not as widely recycled as #1 and #2.
6	Polystyrene (PS)	Two forms, inflated and non-inflated. Inflated form is Styrofoam. Non-inflated is used to make cups, bowls, plates, trays, take-out containers, meat trays, egg cartons and packaging for shipping.	**BAD**	Benzene, which is used in production, is known to cause cancer. Butadiene and styrene (the basic building block of PS) are suspected carcinogens, which can leach into food, especially when heated. Uses a lot of energy. Poor recycling.
7	Other (usually polycarbonate)	Baby bottles, “sippy” cups, reusable water bottle, microwave ovenware, eating utensils, plastic coating for metal cans.	**BAD**	Made with bisphenol-A (BPA), which disrupts the body’s endocrine system. Can pose risks to fetuses, infants, and children. Can leach into food as product ages.
7PLA	Polylactide biodegradable corn and plants	Plastic wrap, freezer bags, and sandwich bags.	**GOOD**	Environmentally safe and sustainable because they are biodegradable. Not recyclable.

Food Additives and Intolerance

Food additives are ingredients that preserve flavor or improve the taste of a product. They include: dyes, antioxidants, emulsifiers or stabilizers, flavoring enhancers, or preservatives. Today, there are over 14,000 man-made preservatives and additives added to the food we eat! The Food and Drug Administration (FDA) must identify them as "Generally Recognized as Safe" (GRAS) before they can be added to food products. Yet, it is thought that some of them can cause symptoms of physical illness, such as abdominal pain, vomiting, diarrhea, headaches, fatigue, and breathing problems.

You may have an allergy or intolerance to a food additive if you usually have symptoms after eating foods that are pre-packaged or from a restaurant. Some of these reactions are allergies. Most of them may actually be intolerances. Food allergies can be identified through allergy testing. Food intolerances, however, can only be discovered by trial and error. If your symptoms stop when you quit eating food containing suspected additives, then it is likely you have an intolerance to them. Detecting food intolerances requires careful reading of food labels. Unfortunately, not all additives are listed on labels. A food diary can be helpful during this process. Keep careful track of the food you eat, the symptoms you have, and when they occur. Our handout *Elimination Diet* will give you more information on how to do this.

SOME COMMON FOOD ADDITIVES

Chemical	Foods that contain it	Symptoms/Diseases
MSG	Chinese food	Headache, nausea, asthma, weakness
Yellow dye #5 (tartrazine)	Mountain Dew, yellow dyed foods	Allergy, overactive behavior, asthma
Xylitol/sorbitol	Sugarless gum	Abdominal spasm and cramping
Nitrates/nitrites	Processed meats	Headache, hives
Aspartame/saccharin	Artificial sweetener	Headache, cancer in animal studies
Benzoates	Juice, carbonated drinks	Asthma, allergic rhinitis, hyperactivity
Sulfites	Dried fruits, bottled lemon juice	Asthma, allergy or severe, rapid reactions
Carrageenan	Nut milks, pudding, snack bars	Irritable and inflamed bowels
High fructose corn syrup	Sweetened processed foods	Diabetes, obesity, fibrosis of liver
Trans fat	Partially hydrogenated oils	Heart disease, diabetes

For more information on food additives, see the websites below:

- Information from the FDA on food ingredients and colors: http://www.fda.gov/food/foodingredientspackaging/ucm094211.htm
- In depth review of food additives from the Center for Science in the Public Interest: : http://www.cspinet.org/reports/chemcuisine.htm
- Recipes for people with food intolerances from the Better Health Channel (State Government of Victoria, Australia): http://www.betterhealth.vic.gov.au/bhcv2/bhcsite.nsf/pages/bhc_recipes?opendocument

Genetically Modified (GMO/GM) Foods

A genetically modified organism (GMO) is living material in which the genes have been changed in a way that does not occur naturally. This genetic engineering can be used to grow genetically modified (GM) plants for food. This is done so crops are more resistant to insects and disease and fewer chemicals are needed during the growing season. There is currently no indication that GMO foods are harmful to our health, although very little research has been done in this area. Few GMO fruits or vegetables are available at stores. However, most processed foods contain GMO ingredients from soybeans or corn. Currently in the U.S., it is not required to label GMO foods but there are many petitions to get this changed. Follow the guidelines below if you would like to avoid or reduce your intake of GMO foods:

1. These products are most likely to be GMO: soybeans, corn (especially in high fructose corn syrup), rapeseed/canola, sugar beets, rice, cottonseed oil (present in vegetable oil and margarine), dairy from hormone-injected cattle, aspartame, papayas, and farm-raised salmon.
2. Buy foods that are 100% organic as GMO foods cannot be labeled with this designation. Regular "organic" foods can contain up to 30% GMOs.
3. Buy beef that is 100% grass-fed.
4. Seek products that are labeled as non-GM or GMO-free. (Foods are not often labeled since it is not required by the FDA.)
5. Shop locally at farmers' markets or get your produce from a Community Supported Agriculture (CSA) farm.
6. Buy whole foods that you cook and prepare yourself, rather than processed or pre-prepared foods.
7. Grow your own food!

For more information on GMOs, see the website below:
World Health Organization Q&As on GMOs:
http://www.who.int/foodsafety/publications/biotech/20questions/en/

Links for General Food Safety Information

- FDA website on food topics: http://www.fda.gov/Food/default.htm
- CDC website on food safety: http://www.cdc.gov/foodsafety/
- University of Wisconsin-Extension website on food safety and health: http://www.foodsafety.wisc.edu/
- World Health Organization (WHO) website on food safety: http://www.who.int/foodsafety/en/
- CDC Info on food outbreaks in the U.S.: http://www.cdc.gov/outbreaknet/outbreaks.html
- U.S. government website on food recalls/alerts, keeping food safe, and food poisoning: http://www.foodsafety.gov/ .

Books to Read

1. ***Food Rules: An Eater's Manual*** by Michael Pollan. Penguin Books: 2009
2. ***The Omnivore's Dilemma*** by Michael Pollan. The Penguin Press: 2006.
3. ***Fast Food Nation: The Dark Side of the All-American Meal*** by Eric Schlosser. Houghton Mifflin Company: 2001.

The information in this handout is for general education. It is not meant to be used by a patient alone. Please work with your health care practitioner to use this information in the best way possible to promote your health.

References

1. Environmental Working Group. EWG's 2012 Shopper's Guide to Pesticides in Produce™. Website: http://www.ewg.org/ :2012.
2. Environmental Protection Agency. What you need to know about mercury in fish and shellfish. Website: http://water.epa.gov/scitech/swguidance/fishshellfish/outreach/advice_index.cfm: 2004.
3. Pan et al. Red Meat Consumption and Mortality: Results from 2 Prospective Cohort Studies. *Arch Intern Med*. 2012;172(7):555-563.

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Notes: