2010 Meals for Many

MPC

MEALS PARTNERSHIP COALITION

"WORKING TO ENSURE THAT MEALS ARE AVAILABLE FOR HUNGRY PEOPLE"

August 11th, 2010

Hosted by Seattle's Union Gospel Mission with Special Guest Chef: John Platt

9:00 A.M. - 3:00 P.M.

During 2009 the members of Meals Partnership Coalition served more than 3,000,000 meals to community members in need. This was accomplished while keeping one thing in mind: **SERVING SAFE & NUTRITOUS MEALS FOR A VULNERABLE COMMUNITY .**

Through your diligence and commitment to nutritional excellence, food safety, and chemically safe foods we were able to accomplish this great task without any reports of food borne illness outbreaks.

Today we will discuss the Eat Real Food Campaign and how it serves as a model of excellence for our community meal providers, how to best use foods within the donation stream, what constitutes whole foods, environmental foods safety, and tips & tricks for large meal preparation. In addition, you will have the opportunity to work with other meal providers, and get to know some of the challenges and triumphs that they have faced while meeting the growing need for nutritionally excellent meals in our community

2008 Meals for Many event at Operation: Sack Lunch

Today's Menu

Main Dish: Citrus Yogurt Chicken

Vegetable: Blasted Broccoli

Second Side: Coconut Brown Rice

Dessert: Blueberry Clafouti(s)

Meals for Many

August 11th, 2010

A meal provider training sponsored by Meals Partnership Coalition and this year hosted by Seattle's Union Gospel Mission

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Section 1 – Food Safety

Food Safety is Everybody's Business

Your guide to preventing foodborne illness

Washington State Food & Beverage Workers' Manual

Table of Contents

The information provided in this manual is based on the Washington State Retail Food Rule and is intended to be used in conjunction with attendance in the Food Worker Training Class. This handbook does not represent all requirements provided in the Washington State Retail Food Rule. For more information, contact your local health department.

Washington State Department of Health

DOH Pub 332-036 April 2005 The Department of Health is an equal opportunity agency. If you need this publication in an alternative format, please call 1-800-525-0127 (voice) or 1-800-833-6388 (TTY relay service).

PUBLIC HEALTH
ALWAYS WORKING FOR A SAFER AND HEALTHIER WASHINGTON

Thank you.

We appreciate that you are taking an active role in learning to prepare and serve safe food. As a food worker, you will be making food for other people. They trust you to do all that you can to keep their food safe. **It is your responsibility to safely prepare and serve food to them so they will not get sick.**

The information in this manual will give you tips to safely store, prepare, and serve food at work and home.

The manual is divided into two parts:

Part 1	Introduction to foodborne illness
Part 2	How to keep food from causing illness

By the time you have finished this manual you will:

1. understand there are many causes of foodborne illness
2. identify the importance of clean hands and healthy food workers
3. know how avoiding the Danger Zone helps prevent foodborne illness
4. learn several tips to help you remember food safety basics
5. recognize your responsibilities as a food worker

Food safety knowledge can help you protect yourself and others. Please take what you learn from this manual and use it at your workplace and in your home. If you have any questions, please call your local health department.

Remember that food workers using proper food safety practices are the most important ingredient in safe food. Welcome to the food safety team in Washington State.

Foodborne Illness

Foodborne illnesses do not just happen at restaurants. Everyone that handles food can spread foodborne illness.

People can get sick if the food they eat has harmful chemicals or germs. This is called foodborne illness. Most foodborne illnesses are either food poisonings or foodborne infections.

When people talk about foodborne illness, they often call it **food poisoning**. Chemicals, bacteria, or certain foods like poisonous mushrooms can cause food poisoning. Symptoms of food poisoning are usually noticed within hours after eating, and often include vomiting.

Germs that cause foodborne illness are usually bacteria, viruses, or parasites.

The most common foodborne illnesses, however, are *not* caused by food poisoning. They are **foodborne infections** caused by germs that grow in food or inside of our bodies. Symptoms of foodborne infections include diarrhea, vomiting, fever, headache, and stomach aches. Symptoms may be noticed from several hours to several weeks after eating the food.

In the United States, the Centers for Disease Control estimates that about 76 million Americans get sick and up to 5,000 people die each year from unsafe food. Following the food safety practices in this manual can help you prevent the most common causes of foodborne illness.

Person in Charge: Someone at each establishment must be in charge during all hours of operation and must make sure that all food safety steps are followed. The person in charge must know the Washington State Food Rules and the procedures used in the establishment. If you have questions, ask the person in charge. If you are the person in charge, you should be able to give food workers training or information needed to perform their jobs correctly.

Highly Susceptible Populations

Certain foods are more likely to cause foodborne illness in highly susceptible people.

These foods include:

- **undercooked meats**
- **raw oysters**
- **undercooked eggs**
- **sprouts**
- **unpasteurized milk or juices**

Although anyone can get sick from food handled unsafely, certain people usually get sick more often or have more serious illnesses. These people are called the Highly Susceptible Population. They are:

- **Y**ounger than 5 years old
- **O**lder than 65 years old
- **P**regnant
- **I**mmune-compromised (due to cancer, AIDS, diabetes, certain medications, or other conditions)

In order to remember the people in the group, the group is sometimes called by the name YOPI (**yo**´pē).

Facilities like hospitals, child care centers, preschools, nursing homes, and adult care homes that provide food and services to a Highly Susceptible Population have additional food safety requirements. Several of these requirements are highlighted throughout this manual. For more information, call your local health department.

Hazards in Food

The goal of food safety is to prevent the hazards that cause foodborne illness or injury. Most of the hazards in food are things you cannot see, smell, or taste.

A foodborne hazard is a physical, chemical**,** or biological object in food or drink that can cause injury or illness. **Most foodborne illnesses are caused by biological hazards (germs).**

Hazard	Examples	It happened in Washington…
Physical	Hard or soft objects in food that can cause injury. *Examples include broken glass, jewelry, adhesive bandages, staples, and fingernails.*	Several staples were found in a birthday cake from a bakery in Eastern Washington. The cake was prepared below papers stapled to a memo board.
Chemical	Poisonous substances that occur naturally or are added during food handling. *Examples include cleaning agents, pesticides, and certain metals.*	Due to a broken valve in a soda machine, several Western Washington customers got copper poisoning within minutes after drinking soft drinks.
Biological	Germs that cannot be seen without a microscope. *Examples include parasites, bacteria, and viruses.*	Several customers became infected with hepatitis A after eating sandwiches prepared by an ill food worker in Western Washington.

Physical Hazards

Physical hazards are objects in food that may cause injury if eaten. Physical hazards usually happen because of unsafe food handling practices or accidental contamination. To prevent physical contamination:

- wash fruits and vegetables carefully
- look closely at the foods you prepare
- keep the food preparation area free of things that can fall into the food

Chemical Contamination

Chemicals may cause foodborne illness if they get into food. All chemicals such as soaps, cleaners, sanitizers, and pesticides must be stored away from food, utensils, and food preparation areas.

If a chemical needs to be stored in the kitchen area, the chemical must be stored below food or food-contact surfaces so that it does not drip onto food. If a chemical is not needed in the establishment, then the chemical should not be there at all.

All chemical containers must have easy-to-read labels and easy-to-follow directions.

Food Storage Containers

Galvanized containers have a layer of zinc so the container will not rust. They should not be used to store food.

Some containers are not approved for food storage. Unapproved containers include garbage bags, galvanized cans, and containers once used for chemicals. Food may not be stored in these containers because chemicals can get into the food.

To keep your food safe from chemicals:

- only keep chemicals in the establishment that are approved for use near food
- store all chemicals below or away from food and work surfaces
- label all chemicals
- only use approved containers to store food
- make sure equipment is working properly
- make sure food is protected when you clean the kitchen

Biological Contamination

We live in a world with lots of germs. Most germs are good for us, but some can make us sick. This manual focuses on the harmful germs that cause most foodborne illnesses: parasites, viruses, and bacteria.

Parasites

Parasites in food are usually tiny worms that live in fish, pork, or meat. They can be killed if frozen or cooked to the right temperatures. Different kinds of parasites may be found in contaminated water.

To keep your food safe from parasites:

- cook all pork, beef, and fish to the proper temperatures
- use fish that has been treated to kill parasites for raw dishes like sushi
- use approved sources of water

Viruses

Although viruses are small, it only takes a few to make you sick. Unlike parasites, viruses are not destroyed by freezing.

We've all had an illness from a virus. Chicken pox, the common cold, and influenza are all caused by viruses spread from people coughing or sneezing. The viruses that we get through food usually come from the unclean hands of someone that touched our food. Unfortunately, the person's hands were probably not washed well enough to remove germs from vomit or feces. We call it the fecal-oral route of transmission. Everyone else calls it gross.

As gross as it might be, you've probably heard of a few of the viruses we spread this way, like hepatitis A and Norovirus. To prevent these common illnesses, we must be careful about personal hygiene, especially when working with food.

To keep your food safe from viruses:

- do not work with food when you have diarrhea, vomiting, or fever
- wash your hands twice after using the toilet – once in the restroom, and then again when you get back in the kitchen
- use gloves or utensils instead of bare hands when handling ready-to-eat food

Bacteria

Unlike viruses, bacteria *can* grow in food. They are found everywhere and can grow when food workers are not careful about time, temperature, and cleanliness. Bacteria can spoil food or cause foodborne illness.

Bacteria that cause foodborne illness come from sources like soil, animals, raw meat, and people. Although they can come from lots of places, these bacteria usually only grow in certain foods. These foods are called POTENTIALLY HAZARDOUS FOODS. **Keep potentially hazardous foods hot or cold to keep bacteria from growing.**

Potentially Hazardous Foods

Potentially Hazardous Foods include:

Animal Products

- Meat, fish, poultry, seafood, eggs
- Dairy products

Cooked Starches

- Cooked rice, beans, pasta, potatoes

Fruits and Vegetables

- Cooked vegetables
- Tofu
- Sprouts (such as alfalfa or bean sprouts)
- Cut melons
- Garlic or herbs bottled in oil

Potentially Hazardous Foods

To keep your food safe from bacteria:

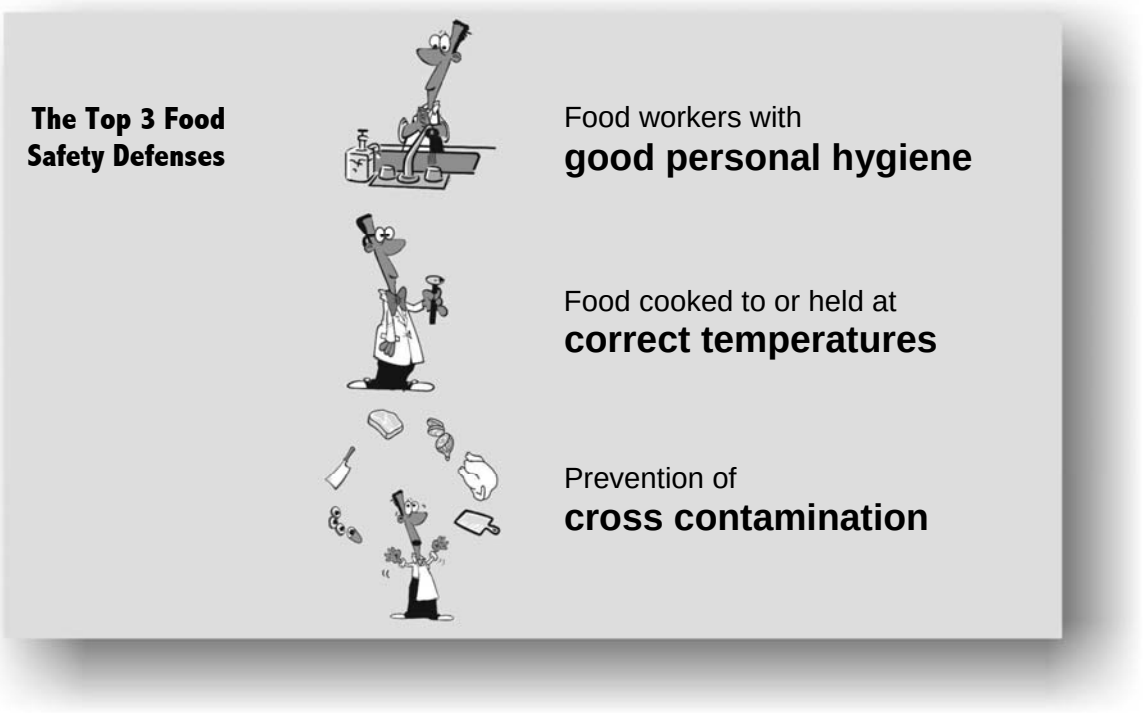
- keep potentially hazardous foods out of the Danger Zone (41°F-140°F)
- do not work with food when you are ill (diarrhea, vomiting, or fever)
- wash your hands twice after using the toilet – once in the restroom, and then again when you get back in the kitchen
- use gloves or utensils instead of bare hands when handling ready-to-eat food
- wash, rinse, and sanitize all equipment used for food preparation

Part 2 Preventing Illness

The Top 3 Food Safety Defenses

Now that you know germs cause almost all foodborne illnesses, let's talk about what you must do to keep germs from causing illness through food. Because people cannot usually see, smell, or taste germs in food, it is important to practice food safety even when the food looks fine.

The next few pages will go over the top three food safety concepts – **personal hygiene, temperature control, and cross contamination** – that must be combined to keep food safe from germs.



Personal Hygiene

Food workers, even if they look and feel healthy, may accidentally spread harmful germs to food if they do not have good hygiene. **Food workers with good personal hygiene help keep germs from getting into food.**

Proper food worker hygiene includes:

- **not working with food when you are sick**
- **washing your hands the right way and at the right time**
- **using clean gloves and utensils when handling food**
- **keeping fingernails trimmed so hands can be easily cleaned**

Food Worker Health

A healthy food worker is one of the most important ingredients in preventing foodborne illness. When you feel sick, you should not work with food. The germs making you sick may be spread to the food and other people.

Too Sick to Work with Food

Food workers may not work with food if they have:

- **diarrhea, vomiting, or jaundice**
- **diagnosed** infections that can be spread through food such as *Salmonella*, *Shigella*, *E. coli*, or hepatitis A
- **infected**, uncovered wounds
- **continual** sneezing, coughing**,** or runny nose

Food workers must tell the Person in Charge when they are sick. **Sick food workers should go home.** If sick food workers cannot go home, they may be given duties that do not involve handling food or clean food-contact surfaces. These other duties include taking out the trash, mopping, sweeping, cleaning restrooms, or bussing tables.

Highly Susceptible Populations

Food workers that work in facilities that serve a Highly Susceptible Population (YOPI group) **may not** work in the facility if they have diarrhea, vomiting, or jaundice. Sick food workers MUST NOT COME TO WORK until all symptoms are gone.

Handwashing

Clean hands are the most important food safety tool, but just because your hands look clean doesn't mean they don't have germs on them. Handwashing gets rid of the germs on hands that can make people sick. **It is important to wash your hands often throughout the day, even when they look clean.**

Washing your hands often is the most important thing you can do to keep germs out of your body and out of the food you prepare. Food workers must know when and how to wash their hands.

When to Wash

Food workers are required to wash their hands *before* they begin food preparation and any time hands may be contaminated. The times of heaviest contamination include:

- after using the toilet
- after handling raw meat, fish, or poultry
- after handling garbage or dirty dishes
- after taking a break, eating, or smoking
- after sneezing, coughing, or blowing the nose
- after handling animals or using chemicals

Hand Sanitizers

Hand sanitizers work best on hands that are clean. In food service, you may use hand sanitizers after washing your hands if you'd like, but you may ***not*** use them instead of washing your hands.

How to Wash

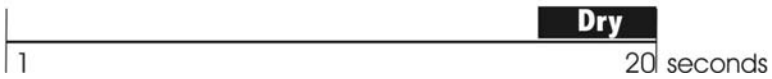
You must wash your hands at a handwashing sink that has hot and cold running water, soap, and paper towels (or other single-use drying method). From start to finish, all food workers must wash their hands for at least 20 seconds.

Step 1: Get your hands wet so the soap will work.

Step 2: Apply soap and scrub. Be sure to scrub under the fingernails, between the fingers, and all the way up to the lower arm. Hands need to be scrubbed for at least 10-15 seconds. Time yourself until you get used to it. This scrub time is longer than most people wash!

Step 3: Rinse hands to send the soap suds and germs down the drain.

Step 4: Dry hands completely with a paper towel, or other single-use method. Paper towels are preferred because scrubbing with the towel helps remove more germs.



Preventing Bare Hand Contact

Even when food workers wash their hands well, they are not allowed to touch ready-to-eat foods with their bare hands. This is to keep germs that might remain on the hands from getting onto ready-to-eat foods.

Ready-to-eat foods are foods that are served without additional washing or cooking to remove germs.

Ready-to-eat foods include:

- **washed produce that is eaten raw**
  such as sliced fruit, salads, garnishes
- **bakery or bread items**
  such as breads, cakes, pies, tortilla chips
- **foods that have already been cooked**
  such as pizza, hamburgers, hot dogs, tacos
- **foods that will not be cooked**
  such as sandwiches, sushi, deli salads

Gloves

Food workers must use utensils such as tongs, scoops, deli papers, or single-use gloves to keep from touching ready-to-eat foods. For example, tongs should be used to put sliced vegetables into salads and scoops should be used to get ice out of an ice bin.

Single-use gloves may be used to prepare foods that need to be handled a lot, such as when making sandwiches, slicing vegetables, or arranging food on a platter. It is important to remember that gloves are used to protect the food from germs, not to protect your hands from the food. Gloves must be changed often to keep the food safe.

Gloves must be worn if you have sores, bandages, or cuts on your hands and you're working with food.

Important Rules for Using Gloves:

- wash hands before putting on gloves
- change gloves that get ripped
- change gloves that might be contaminated
- never wash or reuse gloves
- change gloves between working with raw and ready-to-eat foods
- throw gloves away after use
- wash hands after taking gloves off

Personal Habits Affect Food Safety

Eating, Drinking and Smoking

Food workers may not eat, drink, or use any type of tobacco in food preparation areas. This is to prevent spills onto food and to reduce the chance of contamination.

Exception: Food workers may drink from a covered container with a straw. The drink must be stored so that it cannot spill onto food or food-contact surfaces.

Hair Restraints

Hair restraints are intended to keep hands out of hair and hair out of food. Hair must be effectively restrained whenever you are working around food or food preparation areas. Hair restraints include hairnets, hats, barrettes, ponytail holders, and tight braids. Long beards must also be restrained.

Fingernails

Fingernails must be trimmed so they are easy to clean. If nail polish or artificial nails are worn, the food worker must wear gloves when preparing all foods, not just ready-to-eat foods. For example, a food worker with artificial nails would need to wear gloves when mixing batter with a spoon.

Jewelry

Jewelry can hide germs that cause foodborne illness and make it hard to wash hands. Jewelry can also fall into food. While preparing food, food workers must remove watches, rings, bracelets, and all other jewelry on the arms or hands.

Exception: Wedding rings may be worn if they are covered with a glove when the food worker is preparing food.

Personal Items

Personal items like medicine, coats, and purses must be stored away from food, dishes, and linens.

Temperature Control

Proper temperatures are required for the safety of potentially hazardous foods. **A thermometer must be used to make sure that food is delivered, cooked, cooled, and stored at the correct temperatu**

Danger Zone
41°F - 140°F

Danger Zone 41°F - 140°F

Most bacteria do not grow in hot or cold temperatures. To keep food safe, cold foods must be kept 41°F or colder. Hot foods must be kept 140°F or hotter. **The range of temperatures between 41°F - 140°F is called the Danger Zone.**

When potentially hazardous foods are left in the Danger Zone, bacteria can grow fast or make poisons that can make people sick.

Time is ticking…
By the time you begin to prepare it, food has been through a lot of steps. It has been grown, shipped, purchased, received, and stored before you begin preparation. You may thaw, mix, cook, cool, serve, or reheat it. All of the time that the food spends in these steps adds up and helps bacteria grow to dangerous numbers. Work with food quickly to keep it out of the Danger Zone.

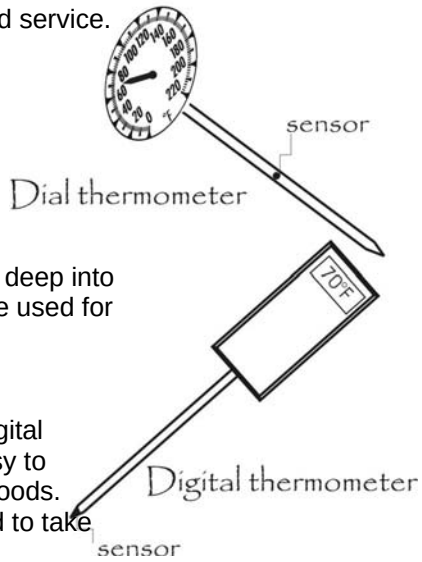
Potentially hazardous food may be at room temperature for up to two hours while you are preparing it. When you are preparing food, only take a little of the food at a time. Keep the rest of the food hot or cold until you're ready to prepare it. **If the food has been left out at room temperature, or you do not know how long it has been in the Danger Zone, you should throw the food away.** It may not be safe to eat.

Thermometers

Two types of food thermometers are usually used in food service.

Metal Stem Thermometer

The metal stem "dial" thermometer is the most common thermometer used in food service. Dial thermometers work well for taking temperatures of thick foods. The stem must be pushed several inches into the food and left in for at least 20 seconds. Because they need to go deep into the food to be accurate, dial thermometers should not be used for thin foods such as hamburger patties.



Digital Thermometer

Digital thermometers are also used to measure food temperatures. They have a metal stem too, but have digital numbers instead of a dial. Digital thermometers are easy to read and are better for measuring temperatures in thin foods. They can read temperatures quickly and should be used to take temperatures of thin foods such as hamburger patties.

Accuracy

Thermometers should be checked often to make sure they read the correct temperature. One way to check for accuracy is to put the thermometer's sensor in a cup of crushed ice and water. The mixture should be 32°F. If the thermometer doesn't read 32°F, the thermometer needs to be adjusted or replaced. Read the thermometer package or call your local health department for more information.

Using a thermometer:

- make sure it is clean, sanitized, and accurate
- insert into the thickest part of the food – usually the center of the food
- take the temperature for several seconds until the numbers stop changing

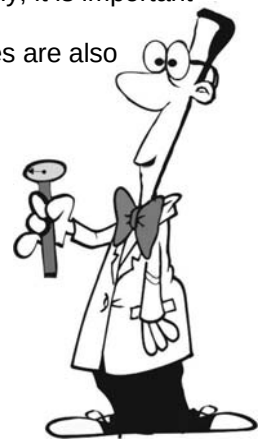
Keep Hot Foods Hot

Cooking

Cooking food to the right temperature is the best way to kill germs that might be in the food. Temperatures must be taken with a food thermometer that is inserted into the thickest part of the food. Cooking temperatures depend on the type of food and the cooking time. For proper cooking times and temperatures, see the chart on the next page.

Microwave

All raw animal products cooked in a microwave oven must be heated to at least 165°F. The food must be covered to maintain moisture, stirred at least once during cooking, and allowed to stand covered for two minutes before serving. Because microwave ovens do not cook food evenly, it is important to measure
the food's temperature in several places. These procedures are also used for foods that are reheated in a microwave.



Hot Holding (140°F or hotter)

Because cooking does not kill all bacteria, cooked potentially hazardous food must be kept hot until served. This way the surviving bacteria will not grow back again. Steam tables, soup warmers, and other hot holding units must be turned on and heated up before hot food is put into them. **Use a thermometer to check the temperature of the food. HOT food must be kept 140°F or hotter.**

Tips for keeping food hot:

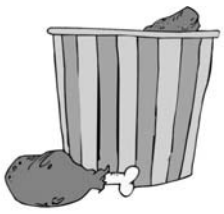
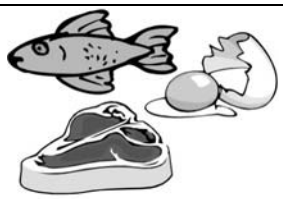
- cover pans
- stir food often to distribute heat
- never mix cold foods with cooked foods

Reheating

Food that is cooked and then cooled may be reheated later to be served again. Properly cooled foods that will be served immediately may be reheated to any temperature.

Cold food that will be hot held must be reheated to at least 165°F quickly (within two hours).

Cooking Temperatures

165°F (for 15 seconds)		• Poultry (chicken and turkey) • Stuffed foods or stuffing • Casseroles • All raw animal products cooked in a microwave • All reheated potentially hazardous foods
155°F (for 15 seconds)		• Hamburger • Sausage
145°F (for 15 seconds)		• Eggs • Fish • Beef • Pork
140°F		• Vegetables that will be hot held • Packaged ready-to-eat foods (such as hot dogs and canned chili) that are heated for hot holding

Note: Additional cooking times and temperatures are available. Beef or pork roasts have additional cooking requirements. Please see the Washington State Food Rule or contact your local health department for more information.

Keep Cold Foods Cold

Cold Holding

Remember, bacteria grow quickly when food is in the Danger Zone. Keep cold food cold in a refrigerator, in ice, or other approved method to keep bacteria from growing. When using ice to keep food cold, the ice must surround the container to the top level of the food. **COLD food must be kept 41°F or colder.**

Cold salads

Potentially hazardous salads made from food at room temperature (such as canned tuna) must be cooled to 41°F within 4 hours of preparation. It is better to make salads and sandwich fillers with cold ingredients when possible.

Thawing

Frozen foods must be thawed safely to keep bacteria from growing. Unsafe thawing can let bacteria grow in the outside layers of the food while the inside layers are still frozen. **There are three safe methods for thawing food:**

- **in the refrigerator**
  Put frozen food in the refrigerator until it is thawed. This method is the slowest and the safest. Be sure that raw meats are on the bottom shelf or in a container so they do not drip onto other foods.
- **submerged under cold running water**
  Keep the food covered in cold (70°F or colder), running water until it is thawed.
- **as part of the cooking process or in the microwave**
  Small items, such as frozen burritos, may be thawed while they cook.

Cooling

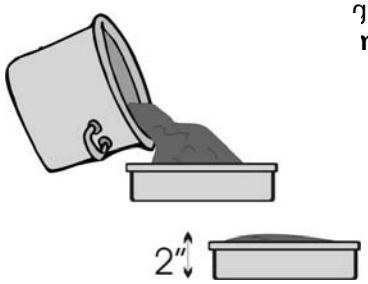
Cooked leftovers that were not served to customers may be cooled to be served again. Because bacteria can grow quickly in cooling food, cooling is often the riskiest step in food preparation. **It is important to cool food through the Danger Zone as fast as possible to keep bacteria from growing.** Please take cooling seriously; certain bacteria can make poisons that are not destroyed by reheating temperatures.

Improper cooling is a leading contributor to foodborne illness.

There are three approved cooling methods in Washington:

1. **shallow pan method (food no more than 2 inches deep)**
2. **size reduction (cutting solid food into smaller pieces)**
3. **time and temperature monitored (forcing food to cool in a short amount of time)**

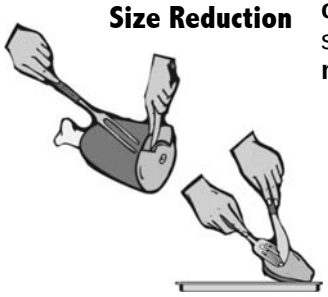
Cooling Method 1: Shallow Pan



Divide large containers of food into several shallow pans to cool. This method works well for foods like refried beans, rice, potatoes, casseroles, ground meat, meatloaf, and chili. **Here are the steps for the shallow pan method.**

1. Put hot food into shallow pans. **Make sure the food is not more than 2 inches thick or deep.**
2. Put the pans in the refrigerator on the top shelf where nothing can drip into them.
3. Let air move around the pans – do not stack or cover the pans.
4. Cover the pans after the food is 41°F or colder.

Cooling Method 2: Size Reduction



A large *whole* food like turkey or ham may be cut into slices to be cooled. This method may not be used for meat that is ground or restructured such as meatloaf or gyro meat. **Here are the steps for the size reduction method.**

1. Cut the cooked meat into pieces no more than 4 inches thick. Be sure to wear gloves if you handle the food.
2. Spread the slices out on a tray so they are not touching each other.
3. Put the pans in the refrigerator on the top shelf where nothing can drip into them.
4. Let air move around the pans – do not stack or cover the pans.
5. Cover the pans after the food is 41°F or colder.

Cooling Method 3: Time and Temperature Monitored

Food may also be cooled using a 2-step process as long as you monitor the temperature of the food and make sure it cools down in a certain amount of time.

Step 1: Food must cool from 140°F to 70°F in 2 hours

Step 2: Food must finish cooling to 41°F within a total of 6 hours

An example of the 2-step method is called an ice bath. An ice bath works well for soups, sauces**,** and gravy. **Here are the steps for an ice bath.**

1. Close the drain in the sink. Put the pot of hot food in the sink.
2. Fill the sink with ice up to the level of the food in the pot. Add cold water to the ice.
3. Stir the food often. Make sure it cools down to 70°F within 2 hours.
4. Add more ice as the ice melts.
5. Finish cooling the food to 41°F within 6 hours.
6. Once the food is 41°F, cover it and put in the refrigerator.

Prevention of Cross Contamination

Cross contamination is the spread of bacteria from raw meat to other foods.

Cross contamination happens when bacteria from raw foods get onto other foods. **Raw meat is the main source of cross contamination.** When blood or juice from raw chicken or other meat gets onto a counter, cutting board, utensils**,** or hands, bacteria can spread to other food.

It is important to keep raw meat away from other food.

Tips to avoid cross contamination:

- wash hands after handling raw meat
- wash and sanitize all food-contact surfaces that touch raw meat
- prepare raw meat in an area away from other foods
- use a separate cutting board for raw meat
- store raw meat below other foods in the refrigerator and freezer
- store meat with a higher cooking temperature (like chicken) *below* meat with a lower cooking temperature (like fish)

Cleaning and Sanitizing

Cleaning and sanitizing are not the same. Cleaning uses soap and water to remove dirt and food from surfaces. Sanitizing uses chemicals or heat to kill germs. It is important to remember that surfaces that look clean may still have germs on them that you can't see. Sanitizing reduces these germs to safer levels.

Sanitize: To use chemicals or heat to reduce germs on surfaces to safe levels

Food-contact surfaces should be washed, rinsed, and sanitized after each use to remove germs that can cause illness.

Other areas in food establishments, like the floors and walls, should also be kept clean. Keeping equipment and kitchens clean will help reduce workplace accidents and the potential for food contamination.

Sanitizers

Sanitizers are chemicals used to kill germs. Sanitizers must be mixed by following the directions on the label. Soap should not be added to sanitizers. Use test strips to make sure the sanitizer is not too strong or too weak.

The most common sanitizer used in food establishments is a bleach solution made by mixing **1 teaspoon unscented bleach with 1 gallon of cool water**.

Wiping Cloths

Wet wiping cloths can be used to sanitize work surfaces that have been cleaned and rinsed. Wiping cloths should be stored in sanitizer when they are not in use. **The sanitizer should be changed often because grease, dirt and food pieces make the sanitizer less effective.**

Tips for using wiping cloths:

- store wiping cloths in clean sanitizer
- use a different wiping cloth for cleaning up after raw meat
- use different cloths for food and non food-contact areas
- clean and rinse dirty wiping cloths before putting them back into the sanitizer
- use test strips to check the sanitizer strength

Washing Dishes by Hand

All dishes and food-contact surfaces must be washed, rinsed, and sanitized between uses. When washing dishes by hand, follow this procedure:

- **clean** and sanitize the sink
- **scrape** leftover food into the garbage
- **WASH** dishes in hot, soapy water in the first sink
- **RINSE** dishes with clean, hot water in the second sink
- **SANITIZE** by soaking the dishes in the third sink filled with warm water and an approved sanitizer
- **AIR DRY** all dishes and utensils instead of using a towel

Washing Dishes in a Dishwasher

Some establishments have a mechanical dishwasher that will wash, rinse, and sanitize the dishes. When using a dishwasher, you must scrape leftover food from the dishes before putting the dishes on the rack. Dishwashers use chemicals or heat to sanitize. Food workers that use the dishwasher must be trained on how to make sure the machine is washing and sanitizing properly. Temperature gauges and sanitizer levels must be monitored.

Food Sources All food served to customers must come from a source approved by the health department. You may not serve food prepared at home. Meat, poultry, and dairy products must be inspected by the United States Department of Agriculture or the Washington State Department of Agriculture.

Shellfish Shellfish like clams, oysters, or mussels must have an identification tag attached to the container. The tags must be kept for 90 days after the shellfish is sold.

Receiving Food Food should not be spoiled. Packaged or canned foods must be returned or thrown away if they are opened, rusty, or severely damaged. Potentially hazardous food should be 41ºF. Do not accept food delivered at an unsafe temperature or in an unsafe condition.

Consumer Advisory Animal products such as chicken, hamburger, seafood, and pork are more likely to cause foodborne illness if they are not cooked to the right temperature. Customers must be told which menu items can be ordered undercooked and that the undercooked food can cause illness. Talk with the person in charge or your local health department for more information.

Food Allergies Just as some people are allergic to bee stings, some people have allergies to food. Food allergies are often serious and can cause sudden, life-threatening reactions. Symptoms of an allergic reaction include a tingling sensation, hives, swelling of the mouth and throat, difficulty breathing, and loss of consciousness. **Get the person in charge immediately if any customers have these symptoms.**

Foods that cause the most allergies include milk, soy, eggs, wheat, peanuts, nuts, fish, and shellfish. Even a small amount of the food can make the person very ill.

People that have food allergies must AVOID any source of the food that makes them sick. For example, someone that is allergic to eggs must avoid cakes, pastas, mayonnaise, or even foods that are prepared on equipment used with eggs. Customers may ask you about menu items, how the food is prepared (to make sure the equipment used for their meal is not used with the foods that they are allergic to), and information from the labels on the food. Their safety depends on accurate answers from you and safe preparation steps in the kitchen. Talk with the person in charge if you have questions.

Pest Control

Pests like rodents, cockroaches, and flies must be kept out of food areas because they may spread germs. Pesticides should only be used as a last resort and applied by licensed pesticide applicators when the food is protected. It is easier to keep pests out than to use pesticides once they are there.

To keep pests out of food establishments:

- keep doors closed or screened and cover holes in walls
- cover garbage cans with lids and throw away used boxes
- keep food covered and clean all spills quickly

Emergencies

Food businesses must stop serving food and call the health department when there is a health hazard that can make the food unsafe. Health hazards include:

- fire, flood, or sewage backup
- no hot water or electricity
- possible foodborne illness outbreak or chemical contamination

Food Protection During Service

Unwrapped, ready-to-eat foods that are on display for customer self service must be protected from contamination. Protection includes:

- condiment dispensers or single-use packets
- utensils at each item on the salad bar or buffet
- display cases or sneeze guards
- extra plates at buffets so customers use a clean plate for each trip
- employees monitoring the self-service area

Re-service of Food

When a customer leaves unpackaged food on the table, you must throw it away. Uneaten food such as rolls, tortilla chips, and breadsticks may not be re-served.

Unopened, packaged food such as crackers, sugar, and jelly may be re-served in restaurants. However, these unopened packages may ***not*** be re-served in facilities and care centers that serve a Highly Susceptible Population.

Prohibited Foods

Certain foods may ***not*** be served raw or undercooked in facilities and care centers that serve a Highly Susceptible Population. These foods include:

- undercooked fish, shellfish, beef, eggs, chicken, or pork
- seed sprouts, such as alfalfa sprouts
- packaged juices that are not labeled “pasteurized”

Special Reminders for Food Workers

Waitstaff

- You may be responsible for checking the holding temperatures on the buffet or salad bar (see temperature control on page 14).
- Gloves or other utensils must be used for handling all ready-to-eat foods, even if you're just buttering toast (preventing bare hand contact is on page 12).
- Customers may ask you questions about how the food was prepared (read about allergies and consumer advisory on page 24).

Child care providers

- Be sure to understand the wash, rinse, and sanitize steps. Many toys and other surfaces in child care facilities use the same cleaning technique.
- Handwashing is not only important for you as a food worker, but also important for the children before they eat (handwashing instructions are on pages 10-11).
- Many dishes are served family-style. Use utensils that children can handle and be ready to replace utensils that are dropped, licked, or incorrectly used.
- Children's medications that must be refrigerated in the kitchen must be labeled and kept in a water-tight container.

Bussers

- Dirty dishes need to stay away from all clean food preparation areas and food.
- After clearing tables, you must wash your hands before you begin another activity (see more information on handwashing on pages 10-11).

Dishwashers

- The sinks and your hands might be contaminated. Be sure to wash them before you begin (check out handwashing on pages 10-11).
- Change the wash water often to better clean the dishes (see page 21).
- Routinely measure the sanitizer solution with appropriate test strips.
- If you use a mechanical dishwasher, you must know how to use it and how to check that it's sanitizing properly.
- Be sure to read and follow the directions on chemical labels.

Bartenders

- Bare hand contact is not permitted, even if it's just squeezing a lemon into a drink. Prepare garnishes like lemon twists and sliced fruits with gloves in advance rather than preparing them bare handed for each drink.
- Be sure to use an ice scoop rather than handling the ice (read more about preventing bare hand contact on page 12).

Grocery clerks

- Cross contamination can happen while you're bagging groceries. Bag meats separately and clean up meat spills with a sanitizer.
- You will likely handle unwrapped produce. Be sure to wash your hands often throughout the day (see pages 10-11).
- Be sure potentially hazardous foods that are left at your aisle are returned to proper temperature control immediately or discarded (see which foods are potentially hazardous on page 7).

Home cooks

- Check your refrigerator temperatures. Food should be kept 41°F or colder and cooled properly to keep your family and friends safe.
- Animals are not allowed in food preparation areas of restaurants because of germs. Keep your pets off of the kitchen counters and out of the kitchen sink at home as well.
- Hosting parties often means lots of food and people. Be sure to plan ahead so that you will be able to keep foods at proper temperatures, make sure you have enough utensils for serving, and rapidly cool leftovers in shallow pans (see cooling on page 19).

Temporary Food Vendors

- Temporary establishments often lack plumbing. Be sure to set up your handwashing station before you begin food preparation.
- Temperature control is often difficult at temporary sites. Have a back-up plan ready in case your electricity goes out or your equipment is unable to keep the food at proper temperatures.
- Plan your menu carefully to limit the number of potentially hazardous foods (see the list of potentially hazardous foods on page 7).

Food Worker Top 10

1. **Only work when you are healthy.**
2. **Wash your hands often and well.**
3. **Don’t touch ready-to-eat food with bare hands.**
4. **Keep food hot or cold.**
5. **Cook food to proper temperatures.**
6. **Cool hot food as quickly as possible.**
7. **Keep raw meat away from other food.**
8. **Wash, rinse, sanitize, air dry – always follow the 4 steps in order.**
9. **Keep food preparation areas and utensils clean and sanitized.**
10. **Ask questions if you have them.**

Food Temperatures and the Danger Zone

When you eat out, you eat foods that are made by someone else. You trust them to make it safe for you to eat. Now you will be preparing food for other people, and they will trust you to do all that you can to keep them from getting sick.

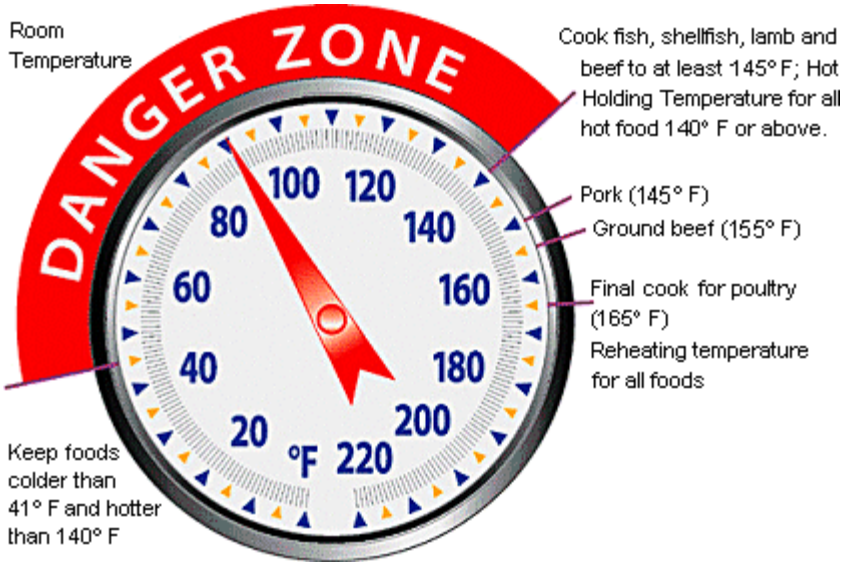
You need to carefully prepare food that you will serve or sell. You will wash raw vegetables; you will cook, cool, reheat, freeze and thaw food. You must keep germs that are already in the food from growing and causing food poisoning.

Washing your hands carefully, and cooking and cooling foods the right way, are the most important things you can do to help keep your customers healthy. Be sure you understand this part, and do these things at work and at home. Your good habits will keep you, your customers and your family safe.

Temperature control
This section is about how to kill germs with heat during cooking and how to stop their growth by keeping the food hot or cold. This is called **temperature control**, and you need thermometers to check food temperatures. There are special thermometers to check foods; there are also special thermometers to check refrigerator temperatures.

The "Danger Zone"

Bacteria, or other germs, need time, food and moisture (or wetness) to grow; but they won't grow when the temperature of the food is **colder than 41º F or hotter than 140º F.** The temperatures in between 41º and 140º are in the "Danger Zone." Keep potentially hazardous foods out of the "Danger Zone!" For example, when food is left in the "Danger Zone", bacteria can grow fast, and make poisons that can make your customers and family very sick.



Preparing food

- Wash your hands.
- No barehanded contact. Use barriers such as tongs, papers, spoons or gloves to prepare and serve ready-to-eat foods.
- Get the food to be fixed from storage, the stove, the cooler or freezer. Take a little food out at a time, and keep the rest hot or cold until you are ready to work with it. Prepare potentially hazardous foods just before you need them.
- Don't let the temperature of the food stay in the "Danger Zone."

Cooking food

Use a **metal stem or digital thermometer** to check temperatures while cooking food to make sure that it gets done all the way inside. Different foods have to reach different temperature degrees to be done or safe. All foods need to be cooked for a minimum of 15 seconds at the required temperatures and roasts need to be held at 130 degrees F for 112 minutes before serving. The metal stem thermometer measures the inside, or internal, temperature of the food. A thermometer that works best shows a range of 0° F to 220º F. The only way you can be sure that the food is cooked

enough is to use a metal stem thermometer placed in the center of the food, even if you also use a **thermostat** to control the temperature in the oven.

When is the food cooked safe?

Here are a few examples of potentially hazardous food and how hot they must be to be safe. They can be hotter, but they must be at least this hot to kill germs:

- Poultry and Stuffing: 165º F
- Pork: 145º F
- Beef, Lamb and Seafood: 145º F
- Rare Beef: 130º F
- Hamburger (ground beef): 155º F

You must place the thermometer in the thickest part of the meat or in the center of the food to get a true reading. (Do not touch a bone with the stem of the thermometer.)

- All poultry, all food made from poultry, all **stuffed meats**, and the stuffing in them must reach 165º F or hotter to destroy Salmonella and other bacteria.
- Hamburger (ground beef) must be cooked to 155º F. This includes all kinds of hamburger such as taco meat and meatloaf, as well as hamburger patties.
- Pork and all foods made from pork must cook to at least 145º F to prevent **trichinosis**, a very serious illness.
- Fish, seafood's, all foods made with seafood, and all other meats, such as beef and lamb, must be cooked to 145º F or hotter to kill the bacteria that cause foodborne illness. Some people like rare beef, and this is the one meat that can be cooked to only 130º F if it is served right away. No raw meat is really safe to eat.

Never cook large roasts, turkeys or stuffed turkeys while they are still frozen. Their big size keeps the insides from cooking to a safe temperature. You must thaw them first so the heat can reach the center of the meat faster.

Microwave ovens do not cook evenly; you must stir and turn the food while it cooks to make sure it cooks to the same temperature in every part. Check the food with a metal stem thermometer before you serve it. (Do not keep the thermometer in the food while it is cooking in the microwave oven.)

How cold is cool? How hot is warm?

Between the time you cook the food and you put away the cooked food in a cooler or freezer, its temperature can fall into the "Danger Zone." You will learn about how to keep cooked foods hot, hot holding, and how to reheat cold food. You will also learn how to get cooked foods cool, and how to keep food cold, cold holding. We begin with cooling hot food the right way.

Cooling

You always take a chance when you have to cool down food. The best way to have safe food is to make it fresh each day, just before you serve it. If you have food that is leftover or made in advance, you must cool it and store it safely. The first rule to remember about cooling: Cool hot food as fast as you can to 41º F or below, past the "Danger Zone."
Food that is not cooled fast enough is one of the leading causes of food borne illness.

Cooling solid and soft foods

Here are the six steps to cool solid and soft foods such as meats, refried beans, rice, potatoes, casseroles, stews, chili and thick soups or chowders:

1. Wash your hands.
2. Before you put away any food, you must place it in shallow metal pans, with the food no more than 2 inches deep.
3. Cut large roasts and turkeys into pieces no larger than 4 inches.
4. Put all meats and other hot food in the cooler or refrigerator as quickly as you can, right away; **do not let the food sit at room temperature for more than 30 minutes.**
5. Do not stack pans; leave space for air to move around them.
6. Wait until the food has cooled to below 41º F before you cover it.

Cooling liquid foods

When you cool thin soup, sauces and gravy, you can use shallow 2-inch metal pans, or you can use the ice and water method, called an "ice bath". Remember, you want the food to cool as fast as possible to below 41º F.

For shallow pan cooling, quickly put the hot food in metal pans that are wide with low sides; the food must be no more than 2 inches deep. Do not cover the food until it has cooled to 41º F in the refrigerator. It may be hard to carry a shallow pan with thin soup in it. The ice bath method works well for this job. Here are nine steps you take to cool food with an ice bath:

1. Wash your hands.
2. Close the drain in a large sink. Place the metal pot or pan of hot food in the sink.
3. Fill the sink with ice up to the level of food in the pot.
4. Add cold water to the ice.
5. Stir the soup or sauce often so that it cools all the way to the center.
6. Add more ice as the old ice melts.
7. Check the food temperature with the metal stem thermometer. (Clean he thermometer stem after each use.)
8. Be sure you have cooled the food from 140º F to 70º F in 2 hours and from 70º F to 41º F within 6 hours.
9. Put the cooled foods into the refrigerator or freezer.

Each refrigeration unit, cold table or cooler must have its own thermometer that gives a true measure of how cold the air is, but you must also check the food with a metal stem thermometer. Air in the cooler must be able to move around the food, so the pans and dishes need to have space between them; do not crowd them.

Cold holding

For cold holding, do not let food stand at **room temperature** because that will allow germs to grow. Store foods in a refrigerator, refrigerated display case, in ice, or other approved method. Always cold hold foods at 41° F or less. Fish, shellfish, poultry, milk and red meat will stay fresh longer if you cold hold them below 41° F. Use the metal stem thermometer to check the food in cold holding, for example, in salad bars, areas where you prepare food, and in coolers. If you use ice to keep the food cold on a salad bar or food display, be sure that the ice comes up to the level of the food that is in the pan or dish. **Food must be colder than 41° F when you put it in the ice.** Cold hold foods at 41° F or less.

Thawing frozen food

There are only three safe ways to thaw foods, and you must plan ahead to allow enough time to do it right:

1. Thaw food in the refrigerator; it may take a few hours or a few days. This is the best and safest way. Be sure to put meat in a container to catch the meat juices and to keep them from dripping on the food below.
2. Hold the food under cool, running water, never under warm or hot water.
3. In a microwave oven; you must then cook it or serve it right away.

Never thaw food at room temperature, on a counter or in warm water. These methods let harmful bacteria grow to high numbers (the "Danger Zone").ever thaw food at room temperature, on a counter or in warm water. These methods let harmful bacteria grow to high numbers (the "Danger Zone").

Some special rules for cold salads and sandwich spreads

You have learned about potentially hazardous food, and how the bacteria grow very easily in them. These foods must not be left at room temperature for even a short time. Foods like potato salad; pasta or macaroni salad egg salad and chicken salad has to be cold enough to keep germs from growing. When you make these foods, start with **cold ingredients**.

- Wash your hands before handling the salad ingredients.
- Make cold salads with cold cooked foods such as potatoes, pasta, chicken and eggs; all ingredients should be chilled to 41° F.

If you wonder about keeping something cold, keep it cold while you check with a supervisor, the boss or the Health Department.

Hot holding

After the food is cooked and ready to serve, keep it warm enough to stop any germs from growing. There is special equipment for this. You must turn on steam tables, soup warmers, and heated surfaces before you need them so that they will be hot enough when you put the cooked food into them. Set the temperature control a little above 140° F, and then check the food with your metal stem thermometer to make sure the food stays at least at 140° F at all times. Stir liquid foods (like soups and gravies) so they don't get cold on top. Covers on the pans will help to keep the heat in and the food warm enough. Do not try to heat cold foods in these warmers. **Hot hold food above 140° F.**

Reheating

Food that is cooked and then cooled may need to be heated again. When you must reheat food, do it very quickly (within 2 hours) to 165° F. The right way to do this is on the stove burners, or in microwave ovens, **convection ovens**, or double boilers. Do not use anything that will heat the food slowly, because it takes too long to pass the "Danger Zone." Stir the food to be sure that all parts of it are hot. Then use your metal stem thermometer to check the temperature. **Reheat foods to 165° F.**

What about food left at the table?

When a customer leaves food on a plate or at the table, you must throw it away. If you have food like chips, rolls and bread and some of it is left over, you cannot serve it again. Unopened packages of crackers, jelly, candy or sugar may be served again.

When the equipment breaks down or power goes off

If the electric power goes off, if the water supply is damaged, if there is no hot water, if the sewer or waste system backs up in the drains:

- Close the business right away.
- Call Public Health at 206-296-4632 for help and advice.

If something goes wrong with the stove, the refrigerators, the freezers, the steam tables, salad bar or display coolers, any equipment that keeps the food safe to serve, you must think and act quickly:

- Be sure potentially hazardous hot foods stay hot (at least 140° F or more).
- Be sure potentially hazardous cold foods stay cold (at least 41° F or colder).

If a refrigerator does not work right, the temperature of the food in it can reach the "Danger Zone." Before you move the food to another cooler check its temperature with the metal stem thermometer. If it is still colder than 41° F, move it quickly to a cooler or refrigerator that is OK.

If a freezer lets food thaw, check the food temperature with a metal stem thermometer. You can prepare the food, if it is still colder than 41° F.

If hot holding equipment like a steam table or soup warmer fails, measure the temperature of the food it was holding. If the food is still hotter than 140° F, you have two choices:

- Move the hot food to equipment that is OK and that will keep it hot.
- Cool the food quickly using shallow metal pans or an ice bath.

You must throw out food that has gotten warmer than 41° F or cooler than 140° F. Do not serve it and do not give it to staff, family or shelters. Call your local Health Department office for help and advice.

7 Food Safety Steps for Successful Community Meals

USDA | Food Safety and Inspection Service

February 2010

For more food safety information, **"Ask Karen"** at **AskKaren.gov** or call the toll-free USDA Meat and Poultry Hotline at **1-888-MPHotline (1-888-674-6854)**; TTY: 1-800-256-7072; **www.fsis.usda.gov**

Whether preparing food for a family reunion or a community gathering, people who are great cooks at home don't necessarily know how to safely prepare and store large quantities of food for large groups. Food that is mishandled can cause foodborne illness. However, by following some simple steps, volunteer cooks can make the event safe and successful!

1 Plan Ahead — Make sure the location meets your needs.

- Be sure you have enough oven, stovetop, refrigerator, freezer, and work space.
- Find out if there's a source of clean water. If not, bring water for preparation and cleaning.

2 Store & Prepare Food Safely

- Refrigerate or freeze perishable food within 2 hours of shopping or preparing; 1 hour when the temperature is above 90 °F.
- Find separate preparation areas in the work space for raw and cooked food.
- Never place cooked food back on the same plate or cutting board that held raw food.
- Wash cutting boards, dishes, utensils, and work surfaces frequently with hot, soapy water.
- Wash hands with soap and warm water for at least 20 seconds before and after handling food and after using the bathroom, changing diapers, or handling pets.

3 Cook Food to Safe Minimum Internal Temperatures — It's the only way to tell if harmful bacteria are destroyed!

- Use a food thermometer to check the internal temperature of meat, poultry, casseroles, and other food. Check temperature in several places to be sure food is cooked to a safe minimum internal temperature.
- Never partially cook food for finishing later because you increase the risk of bacterial growth.

4 Transport Food Safely – Keep hot food HOT. Keep cold food COLD.

- Keep hot food at or above 140 °F. Wrap well and place in an insulated container.
- Keep cold food at or below 40 °F. Place in a cooler with a cold source such as ice or frozen gel packs.

5 Need to Reheat? Food must be hot and steamy for serving. Just "warmed up" is not good enough.

- Use the stove, oven, or microwave to reheat food to 165 °F. Bring sauces, soups, and gravies to a boil.

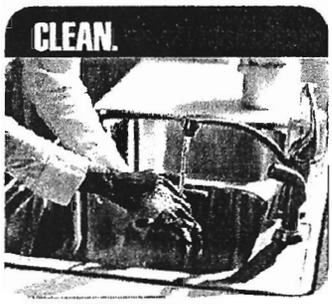
6 Keep Food Out of the "Danger Zone" (40–140 °F).

- Keep hot food hot — at or above 140 °F. Place cooked food in chafing dishes, preheated steam tables, warming trays, and/or slow cookers.
- Keep cold food cold - - at or below 40 °F. Place food in containers on ice.

7 When In Doubt, Throw it Out!

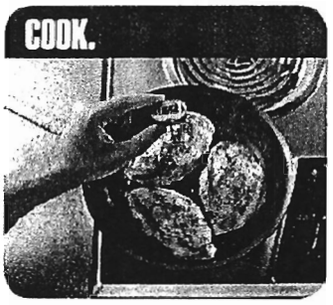
- Discard food left out at room temperature for more than 2 hours; 1 hour when the temperature is above 90 °F.
- Place leftovers in shallow containers. Refrigerate or freeze immediately.

Be Food Safe! Prepare with Care



Wash hands, utensils, and surfaces often.

Don't cross-contaminate.



Use a food thermometer.

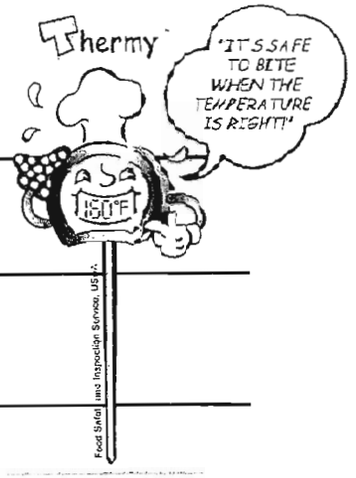
Chill food promptly.

BeFoodSafe.gov

Internal Cooking Temperatures

Product	°F
Egg & Egg Dishes	
Eggs	Cook until yolk & white are firm.
Egg dishes	160
Egg sauces, custards	160
Ground Meat & Meat Mixtures	
Turkey, Chicken	165
Beef, Veal, Lamb, Pork	160
Fresh Beef, Veal, Lamb	
Medium Rare	145
Medium	160
Well Done	170
Fresh Pork	
Medium	160
Well Done	170
Ham	
Fresh (raw)	160
Fully cooked (to reheat)	140
Roast Beef	
Cooked commercially, vacuum sealed, and ready-to-eat	140

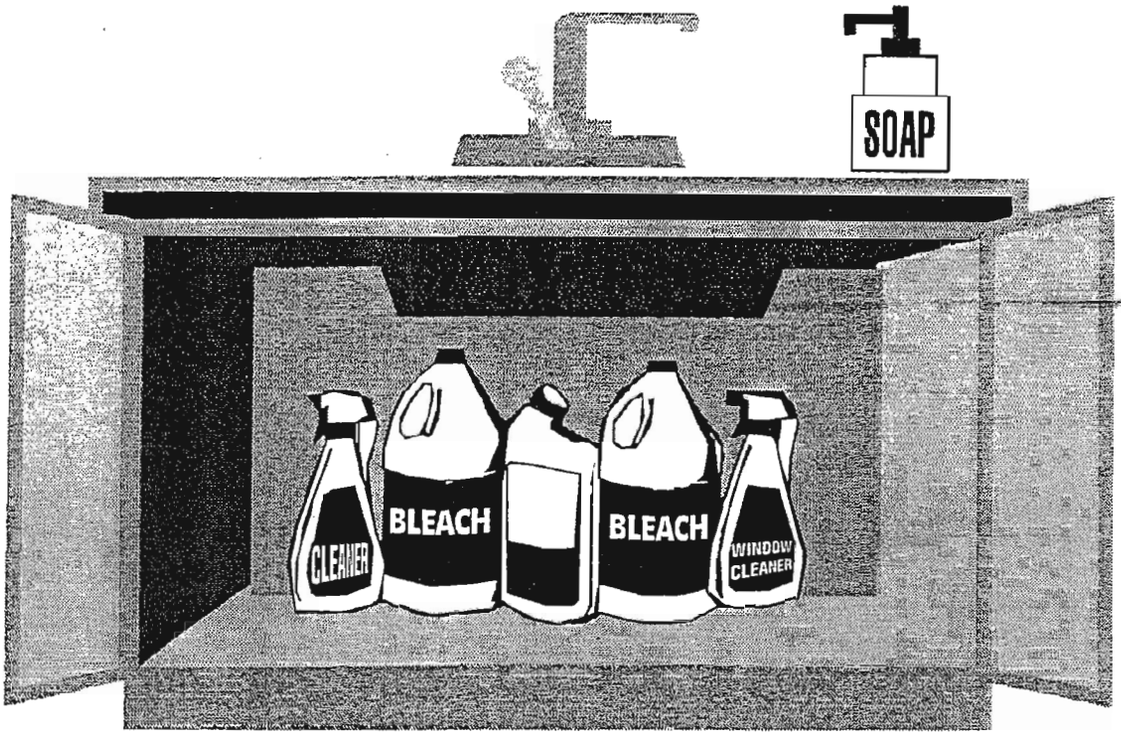
Product	°F
Poultry*	
All products	165
Stuffing	
Cooked alone or in bird	165
Sauces, Soups, Gravies, Marinades	
Used with raw meat, poultry, or fish	Bring to a boil.
Seafood	145
Fin Fish	Cook until opaque and flakes easily with a fork.
Shrimp, lobster, crab	Should turn red and flesh should become pearly opaque.
Scallops	Should turn milky white or opaque and firm.
Clams, mussels, oysters	Cook until shells open.
Leftovers	165



Note: These temperatures are recommended for consumer cooking. They are not intended for processing, institutional, or foodservice preparation. Foodservice workers should consult their state or local food code, or health department.

*safe minimum internal temperature

Proper Chemical Storage



Store chemicals below or away from all food.

- Keep all chemicals away from food. Store chemicals below food, never on a shelf above food or above any food preparation or food equipment area.
- Only store chemicals necessary for operation of the food service establishment.
- Follow label directions carefully.

Good places to store chemicals are in a separate cabinet or under a sink.

Alder Square Environmental Health
1404 So. Central Ave
Kent, WA 98032
206-296-4666

Central Environmental Health
172 20th Avenue
Seattle, WA 98122
206-296-4632

North Environmental Health
10501 Meridian Ave. North
Seattle, WA. 98133
206-296-4838

Northshore Environmental Health
10606 NE 145 Street
Bothell, WA 98011
206-296-9791

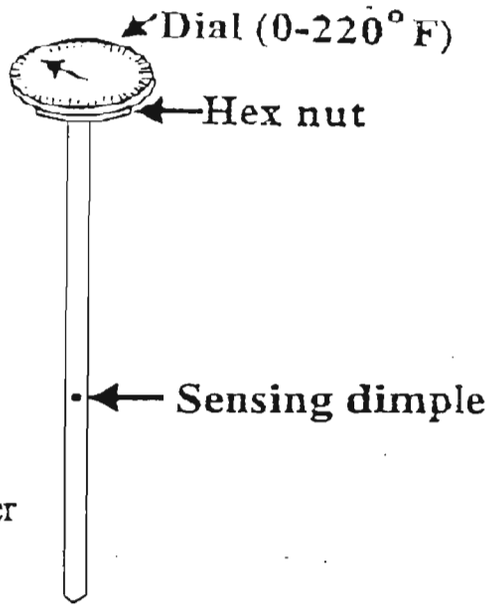
Developed by Benton-Franklin Health District & Seattle-King County Department of Public Health

ENGLISH-3
Benton Franklin Health Dept.
Environmental Health Division
King County Graphics 80166jl.cdr

Seattle - King County
Department of Public Health

Metal-Stem Thermometer Calibration

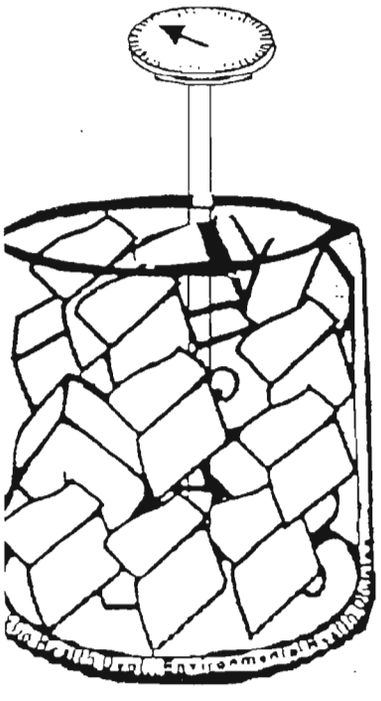
A thermometer must be used to ensure foods are meeting food safety temperatures during cooking, cooling, reheating, cold holding and hot holding. *Thermometers must be checked monthly for accuracy.*



If you are using your metal-stem thermometer to measure both cold and hot temperatures, you must use both the freezing point and the boiling point to check it.

Ensure the thermometer is the same number of degrees "off" on both calibration checks prior to adjustment. If it is the same number of degrees "off", calibrate thermometer and recheck. If it is not the same number of degrees "off", discard the thermometer and obtain a new thermometer.

Checking The Freezing Point



Pack a large cup, glass or jar full of ice cubes. Add cold water to the cup of ice. The ice should not float in the water. Put the thermometer into the ice water, making sure that the 'sensing dimple' is completely under water. After two or three minutes, read the dial. If it reads 32° F, it is ok.

If it does not read 32° F, *notice how many degrees above or below 32 it is.* The difference between 32° and the temperature shown on the thermometer is the number of degrees you have to move the thermometer needle.

1. Take the thermometer out of the water and let it sit at room temperature for two to three minutes.
2. Then, using a crescent wrench or other tool, hold the hex nut firm and turn the thermometer top:

   - If the temperature was too *low*, you must set the thermometer *higher* by turning its top to the *right*. The needle will go *up*. (For example, if the thermometer reads 29°F, you would move the needle 3° up after the thermometer was left at room temperature for 2-3 minutes).

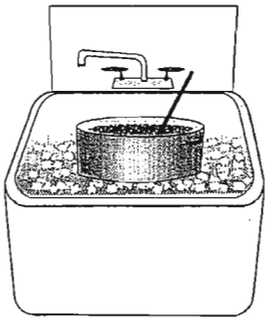
   - If the temperature was too *high*, you must set the thermometer *lower* by turning its top to the *left*. The needle will go *down*. (For example, if the thermometer reads 36°F, you would move the needle 4° down after the thermometer was left at room temperature for 2-3 minutes).

3. Place the thermometer into the ice water again and repeat the process until the dial reads 32° F. You may need to add more ice.

Fact Sheet:

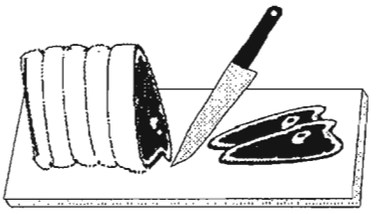
COOLING METHODS

All cooked foods must be rapidly cooled from 135°F to 41°F in six hours, provided that within the first two hours the food is cooled from 135°F to 70°F.



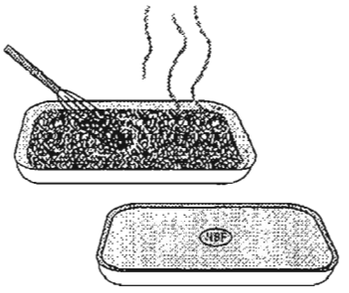
ICE BATH METHOD

- Ice/water mixture should be the same level as the food
- Stir frequently
- Use ice wands



SMALLER PORTIONS

- Cut solid foods into smaller pieces



SHALLOW METAL PANS

- Divide food into smaller pans:
  - 2-inch depth for thick food
  - 4-inch depth for thin liquids
- Use metal pans not plastic
- While cooling keep uncovered or loosely covered
- Don't stack hot containers

Graphics Courtesy of DuPage County Health Department

Public Health – Madison and Dane County (06/04)

Safe Temperatures

Place thermometer in the center of the dish or the thickest part of meat away from bone.

Boil rapidly all liquid leftovers such as soups, gravies, sauces.

Thoroughly heat leftover casseroles and other dishes.

Cook poultry until juices run clear, at least 165°F.
Cook ground meat and pork until no longer pink, at least 155°F.
Cook beef steak and roasts to medium rare or more, at least 145°F.

Cook all eggs until whites are solid and yolks are beginning to set.

140° to 160°F is the temperature for holding hot foods.

Do NOT leave food between 40° and 140°F for more than 2 hours.

Do NOT thaw foods at temperatures between 40° and 140°F.

32° to 40°F is the best refrigerator temperature for cold foods (no more than 45°F). **This is the best temperatures for thawing food.**

0° to -10°F is the best freezer temperature.

Washington State University

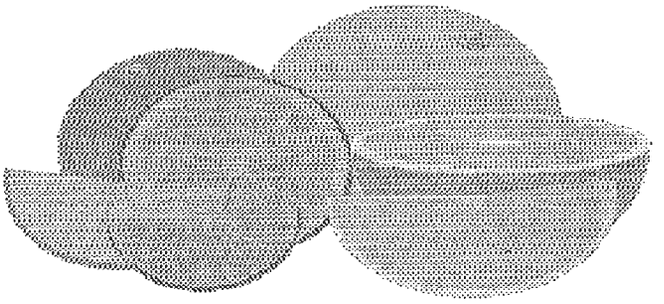
HANDLE MELONS SAFELY

Fruit is an important part of a balanced diet. National guidelines recommend that we eat at least 5 fruits and vegetables each day.

Fresh fruit,like many other foods can pose a risk if not prepared or stored properly. Following some simple guidelines will help keep your fruit fresh as well as safe.

(1) When you buy cut melons be sure they have been buried in ice or displayed on top of ice. Uncut melons does not need to be refrigerated.

(2) Before cutting the outer surface of the melon should be washed with drinking water to remove surface dirt.



(3) Hands and all equipment and utensils (cutting boards,knives, etc.) need tot be washed thoroughly with hot soapy water and rinsed.

(4) Cut melons must be refrigerated at 45 degrees F or below.

Cut melons may be served without refrigeration for a maximum of 4 hours(such as at a brunch, picnic, or buffet). At the end of that time, any leftover melon must be thrown away.

(5) Other fruits(such as oranges,apples lemons, and pineapple) are higher in acid and not as potentially dangerous.

Seattle-King County
Department of Public Health

Daily Temperature Logs

Date	Checked By	40° Cooler Temperature	0° Freezer Temperature	Comments

Cooling Log

FOOD PRODUCT							
DATE							
Time at 135°F		:	:	:	:	:	:
After 1 Hour	Temperature	°F	°F	°F	°F	°F	°F
	Time	:	:	:	:	:	:
After 2 Hours (must be 70°F or below)	Temperature	°F	°F	°F	°F	°F	°F
	Time	:	:	:	:	:	:
After 3 Hours	Temperature	°F	°F	°F	°F	°F	°F
	Time	:	:	:	:	:	:
After 4 Hours	Temperature	°F	°F	°F	°F	°F	°F
	Time	:	:	:	:	:	:
After 5 Hours	Temperature	°F	°F	°F	°F	°F	°F
	Time	:	:	:	:	:	:
After 6 Hours (must be 41°F or below)	Temperature	°F	°F	°F	°F	°F	°F
	Time	:	:	:	:	:	:

Critical Limits	Corrective Action
All cooked foods must be rapidly cooled from 135°F to 41°F in six hours, provided that within the first two hours the food is cooled from 135°F to 70°F.	Reheat to 165°F within 2 hours and serve or reheat and start cooling process over. Discard if out of temperature more than 6 hours.

Corrective Action Taken: _____

_____

_____

Public Health – Madison and Dane County (06/04)

Donated Food Log

(Keep for 30 Days)

Date of Reciept	Food Type	Item Quantity	Donor Source	Potentially Hazardous Food? Y/N
Example: 3/12/2010	*Raw beef*	*1 case*	*Ballard Market*	Y

Meals for Many

August 11th, 2010

A meal provider training sponsored by Meals Partnership Coalition and this year hosted by Seattle's Union Gospel Mission

Meals Partnership Coalition
P.O. Box 4128
Seattle, WA 98194

Ph. (206) 957-3857 info@mealspartnership.org

Section 2 – Recipes and Food Info

Citrus Yogurt Chicken:

50 pounds boneless/skinless chicken breast
Serving size: 4 ounces

Greek Marinade
200 servings:

2 cup	chopped fresh sage
2 cup	chopped fresh rosemary
2.5 TBS	crushed red pepper
2 cup	brown sugar
1 pounds	shallots, chopped
3/4 cup	crushed garlic
1 gallon	grapes, rough chopped
½ gallon	white balsamic
1 gallon	canola/olive oil
¼ cup	salt
¼ cup	pepper

Combine all ingredients except oil in a bowl, then drizzle in oil, whisking. Marinade chicken at least 30 minutes before cooking (overnight is best) and cook with some of the marinade at 375 degrees for approximately 30 - 45 minutes or until chicken reaches 165 degrees.

Pom Yogurt Sauce
200 servings:

2 gallons	yogurt
1 gallon	sour cream
2 Cups	pomegranate molasses (sub OJ concentrate)
1 Cups	honey

Salt and pepper to taste.

Whisk together all ingredients and ladle 2 fluid ounces (small ladle) onto cooked chicken just before serving.

Recipe: Citrus Yogurt Chicken *

Citrus Yogurt Chicken
Number of Servings: 200 (202.05 g per serving)
Weight: 40409.50 g

Recipe

Item Name	Quantity	Measure	ESHA Code	
Chicken, broiler/fryer, breast, w/o skin, raw	50	Pound	15054	
Herb, sage, fresh, INTL	2	Cup	26311	
Herb, rosemary, fresh	2	Cup	26627	
Spice, chili pepper, red, crushed flakes	2.5	Tablespoon	4330	
Sugar, brown, packed	2	Cup	25005	
Shallots, chpd, fresh	1	Pound	5427	
Garlic, cloves, fresh	0.75	Cup	26005	
Grapes, Thompson seedless, fresh	1	Gallon	3055	
Vinegar, balsamic, golden	0.5	Gallon	53464	
Oil, canola & olive, Chef's Duet	0.25	Gallon	44892	Use 1 gallon of oil for marinade. Oil reduced for nutrient content only.
Salt, table	0.25	Cup	26014	
Spice, pepper, black	0.25	Cup	26016	
Yogurt, plain, lowfat	2	Gallon	11967	
Sour Cream, cultured	1	Gallon	504	
Juice, pomegranate, conc	2	Cup	4327	
Honey, amber	1	Cup	63417	
Salt, table	0.25	Cup	26014	
Spice, pepper, black	0.25	Cup	26016	

Nutrients

Nutrients	Per Serving	Nutrients	Per Serving
Basic Components		Vitamin C (mg)	3.80
Calories (kcal)	253.26	Vitamin D - IU (IU)	0
Calories from Fat (kcal)	83.36	Vitamin D - mcg (mcg)	0
Calories from SatFat (kcal)	25.95	Vitamin E - Alpha-Toco (mg)	0.26
Protein (g)	28.50	Folate (mcg)	7.12
Carbohydrates (g)	12.63	Folate, DFE (mcg)	7.12
Dietary Fiber (g)	0.25	Vitamin K (mcg)	2.74

Recipe: Citrus Yogurt Chicken *

Nutrients cont.

Nutrients	Per Serving	Nutrients	Per Serving
Soluble Fiber (g)	0	Pantothenic Acid (mg)	1.00
Total Sugars (g)	11.26	Minerals	
Monosaccharides (g)	1.92	Calcium (mg)	102.53
Disaccharides (g)	2.61	Chromium (mcg)	0.07
Other Carbs (g)	0.96	Copper (mg)	0.07
Fat (g)	9.48	Fluoride (mg)	0.00
Saturated Fat (g)	2.88	Iodine (mcg)	0.12
Mono Fat (g)	4.01	Iron (mg)	1.07
Poly Fat (g)	1.59	Magnesium (mg)	36.35
Trans Fatty Acid (g)	0.12	Manganese (mg)	0.10
Cholesterol (mg)	76.96	Molybdenum (mcg)	0.11
Water (g)	147.62	Phosphorus (mg)	245.53
Vitamins		Potassium (mg)	354.53
Vitamin A - IU (IU)	272.84	Selenium (mcg)	20.74
Vitamin A - RAE (RAE)	35.71	Sodium (mg)	396.90
Vitamin A - Carotenoid RE (RE)	8.67	Zinc (mg)	1.00
Vitamin A - Retinol RE (RE)	31.38	Other Fats	
Beta-Carotene (mcg)	27.99	Omega 3 Fatty Acid (g)	0.08
Vitamin B1 - Thiamin (mg)	0.10	Omega 6 Fatty Acid (g)	0.35
Vitamin B2 - Riboflavin (mg)	0.14	Other Nutrients	
Vitamin B3 - Niacin (mg)	12.76	Gram Weight (g)	202.05
Niacin Equivalents (mg)	17.96	Alcohol (g)	0
Vitamin B6 (mg)	0.66	Caffeine (mg)	0
Vitamin B12 (mcg)	0.47	Choline (mg)	87.09
Biotin (mcg)	0.50		

Notes

Note: Use 1 gallon of canola/olive oil for the marinade. For analysis, the recipe includes 1/4 gallon as most of the marinade is discarded before baking the chicken.

Greek Marinade:

Combine sage, rosemary, red pepper flakes, brown sugar, shallots, crushed garlic, chopped grapes, balsamic vinegar, salt and pepper in a bowl, then drizzle in oil, whisking. Marinade the chicken at least 30 minutes before cooking (overnight is best).

Preheat oven to 375 degrees F.

Bake chicken with some of the marinade for approximately 30-45 minutes or until chicken reaches 165 degrees.

Notes cont.

Pom Yogurt Sauce:

Whisk together yogurt, sour cream, pomegranate molasses (sub OJ concentrate), honey. Add salt and pepper to taste. Ladle 2 ounces (small ladle) onto cooked chicken just before serving.

Blasted Broccoli

200 servings:

91grams per serving or around ½ cup

Ingredients:

40 pounds of broccoli

4 Cups olive oil

Season to taste

Preheat oven to 450°F. Toss broccoli and 4 cups of the olive oil in large bowl to coat. Sprinkle with salt and pepper, spices. Transfer to hotel pan in a single layer Roast 7 - 10 minutes.

Recipe: Blasted Broccoli *

Blasted Broccoli
Number of Servings: 200 (95.66 g per serving)
Weight: 19131.85 g

Recipe

Item Name	Quantity	Measure	ESHA Code
Broccoli, fresh	40	Pound	6757
Oil, olive, extra virgin	4	Cup	8361
Salt, table	0.25	Cup	26014
Spice, pepper, black	0.2	Cup	26016

Nutrients

Nutrients	Per Serving	Nutrients	Per Serving
Basic Components		Vitamin C (mg)	80.94
Calories (kcal)	71.42	Vitamin D - IU (IU)	--
Calories from Fat (kcal)	43.37	Vitamin D - mcg (mcg)	--
Calories from SatFat (kcal)	5.97	Vitamin E - Alpha-Toco (mg)	1.26
Protein (g)	2.57	Folate (mcg)	57.16
Carbohydrates (g)	6.09	Folate, DFE (mcg)	57.16
Dietary Fiber (g)	2.39	Vitamin K (mcg)	92.33
Soluble Fiber (g)	0.22	Pantothenic Acid (mg)	0.52
Total Sugars (g)	1.54	Minerals	
Monosaccharides (g)	1.06	Calcium (mg)	43.16
Disaccharides (g)	0.47	Chromium (mcg)	0.02
Other Carbs (g)	2.16	Copper (mg)	0.05
Fat (g)	4.82	Fluoride (mg)	0.00
Saturated Fat (g)	0.66	Iodine (mcg)	1.81
Mono Fat (g)	3.46	Iron (mg)	0.69
Poly Fat (g)	0.44	Magnesium (mg)	19.25
Trans Fatty Acid (g)	0	Manganese (mg)	0.20
Cholesterol (mg)	0	Molybdenum (mcg)	4.54
Water (g)	81.02	Phosphorus (mg)	60.05
Vitamins		Potassium (mg)	287.97
Vitamin A - IU (IU)	565.48	Selenium (mcg)	2.27
Vitamin A - RAE (RAE)	28.27	Sodium (mg)	169.51
Vitamin A - Carotenoid RE (RE)	56.55	Zinc (mg)	0.37
Vitamin A - Retinol RE (RE)	0	Other Fats	

Recipe: Blasted Broccoli *

Nutrients cont.

Nutrients	Per Serving	Nutrients	Per Serving
Beta-Carotene (mcg)	327.65	Omega 3 Fatty Acid (g)	0.05
Vitamin B1 - Thiamin (mg)	0.06	Omega 6 Fatty Acid (g)	0.37
Vitamin B2 - Riboflavin (mg)	0.11	Other Nutrients	
Vitamin B3 - Niacin (mg)	0.58	Gram Weight (g)	95.66
Niacin Equivalents (mg)	1.08	Alcohol (g)	0
Vitamin B6 (mg)	0.16	Caffeine (mg)	0
Vitamin B12 (mcg)	0	Choline (mg)	16.98
Biotin (mcg)	0.45		

Notes

Note: Amounts for salt and pepper are estimates only and more or less may be needed.

Preheat oven to 450 degrees F.

Toss broccoli and olive oil in a large bowl to coat. Sprinkle with salt and pepper to taste.

Transfer to a hotel pans in single layers and roast 7-10 minutes.

Taste and adjust seasoning as needed. Serve immediately.

Brown Rice Base

Serving size is 100g or ½ Cup

200 servings = around 3 hotel pans

Basic Rice Recipe
(Per Hotel Pan)

16 cups water
2 cans coconut milk
3 oz oil
12 cups rice
1 T salt

Bring water and coconut milk to a boil in sauce pan. In hotel pan, combine rice with oil and salt, stir together until all grains coated. Pour boiling liquid over the rice, stir, cover with foil, and bake (25 minutes for white rice, 45 for brown) in 400 degree oven.

Recipe: Brown Rice Base *

Brown Rice Base
Number of Servings: 200 (34.52 g per serving)
Weight: 6905.00 g

This recipe is for each hotel pan. Please multiply nutrient content 2.5 times for 200 servings.

Recipe

Item Name	Quantity	Measure	ESHA Code
Water, tap, municipal	16	Cup	20041
Coconut, milk, cnd	28	Fluid ounce	4559
Oil, canola	3	Fluid ounce	8084
Rice, brown, long grain, dry	12	Cup	38009
Salt, table	1	Tablespoon	26014

Nutrients

Nutrients	Per Serving	Nutrients	Per Serving
Basic Components		Vitamin C (mg)	0.04
Calories (kcal)	52.57	Vitamin D - IU (IU)	0
Calories from Fat (kcal)	14.22	Vitamin D - mcg (mcg)	0
Calories from SatFat (kcal)	7.59	Vitamin E - Alpha-Toco (mg)	0.21
Protein (g)	0.96	Folate (mcg)	2.77
Carbohydrates (g)	8.68	Folate, DFE (mcg)	2.77
Dietary Fiber (g)	0.39	Vitamin K (mcg)	0.51
Soluble Fiber (g)	0.04	Pantothenic Acid (mg)	0.17
Total Sugars (g)	0.09	Minerals	
Monosaccharides (g)	0	Calcium (mg)	3.86
Disaccharides (g)	0	Chromium (mcg)	0.05
Other Carbs (g)	8.09	Copper (mg)	0.04
Fat (g)	1.59	Fluoride (mg)	0.02
Saturated Fat (g)	0.84	Iodine (mcg)	--
Mono Fat (g)	0.42	Iron (mg)	0.29
Poly Fat (g)	0.24	Magnesium (mg)	17.88
Trans Fatty Acid (g)	0.00	Manganese (mg)	0.45
Cholesterol (mg)	0	Molybdenum (mcg)	--
Water (g)	22.97	Phosphorus (mg)	40.76
Vitamins		Potassium (mg)	33.65
Vitamin A - IU (IU)	0	Selenium (mcg)	2.60

Recipe: Brown Rice Base *

Nutrients cont.

Nutrients	Per Serving	Nutrients	Per Serving
Vitamin A - RAE (RAE)	0	Sodium (mg)	36.74
Vitamin A - Carotenoid RE (RE)	0	Zinc (mg)	0.25
Vitamin A - Retinol RE (RE)	0	Other Fats	
Beta-Carotene (mcg)	0	Omega 3 Fatty Acid (g)	0.04
Vitamin B1 - Thiamin (mg)	0.05	Omega 6 Fatty Acid (g)	0.20
Vitamin B2 - Riboflavin (mg)	0.01	Other Nutrients	
Vitamin B3 - Niacin (mg)	0.59	Gram Weight (g)	34.52
Niacin Equivalents (mg)	0.79	Alcohol (g)	0
Vitamin B6 (mg)	0.06	Caffeine (mg)	0
Vitamin B12 (mcg)	0	Choline (mg)	3.74
Biotin (mcg)	0.12		

Notes

Note: Recipe is Per Hotel Pan; white or brown rice may be used.

Preheat oven to 400 degrees F.

Bring water and coconut milk to a boil in sauce pan.

In hotel pan, combine rice with oil and salt, stir together until all grains are coated. Pour boiling liquid over the rice, stir, cover with foil, and bake (25 minutes for white rice, 45 for brown) in 400 degree oven.

Serving size is 100 g or 1/2 cup.

Blueberry Clafoutis

The texture of this French dessert is between a custard and a cake. Blueberries are used in this version although cherries are the traditional choice, but almost any berry or stone fruit would work."

Prep Time: 15 Min Cook Time: 45 Min Ready In: 1 Hr

200 Servings:

Ingredients

- 50 cups fresh blueberries, rinsed and drained
- 75 eggs
- 25 egg yolk
- 25 cups white sugar
- 25 cups milk
- 1/2 cup and 1 teaspoon vanilla extract
- 18-3/4 cups all-purpose flour, sifted
- 25 pinches salt
- 1-1/2 cups and 1 tablespoon confectioners' sugar for dusting

Directions

1. Preheat oven to 350 degrees F (175 degrees C). Lightly grease several hotel pans.
2. Arrange the blueberries over the bottom of the prepared pan. Whisk together the eggs and egg yolk until light and fluffy. Stir in the sugar, and continue whisking until mixture thickens. Whisk in the milk, vanilla extract, sifted flour, and salt, one at a time, until mixture is light and airy. Pour the mixture over the berries to cover evenly.
3. Bake on center rack in preheated oven until top is golden and springs back when touched, about 45 minutes. Cool slightly, and cut into equal pieces. Dust with confectioners' sugar, and serve immediately.

Nutritional Information

Servings Per Recipe: 200

Amount Per Serving

Calories: 217

- **Total Fat:** 3.3g
- **Cholesterol:** 107mg
- **Sodium:** 89mg
- **Total Carbs:** 42.6g
- **Dietary Fiber:** 1.3g
- **Protein:** 5.2g

Recipe: Blueberry Clafoutis

Blueberry Clafoutis
Number of Servings: 200 (127.41 g per serving)
Weight: 25482.75 g

Recipe

Item Name	Quantity	Measure	ESHA Code
Blueberries, fresh	50	Cup	3029
Eggs, whole, raw, lrg	75	Each	19501
Egg Yolks, raw, lrg	25	Each	19508
Sugar, white, granulated	25	Cup	25006
Milk, 1%, w/add vit A & D	25	Cup	214
Flavor, vanilla extract	0.5	Cup	26624
Flavor, vanilla extract	1	Teaspoon	26624
Salt, table	3	Teaspoon	26014
Flour, all purpose, white, bleached, enrich	18.75	Cup	38030
Sugar, confectioners/powdered, unsftd	1.5	Cup	25009
Sugar, confectioners/powdered, unsftd	1	Tablespo...	25009

Nutrients

Nutrients	Per Serving	Nutrients	Per Serving
Basic Components		Vitamin C (mg)	3.74
Calories (kcal)	213.73	Vitamin D - IU (IU)	21.34
Calories from Fat (kcal)	26.81	Vitamin D - mcg (mcg)	0.53
Calories from SatFat (kcal)	9.00	Vitamin E - Alpha-Toco (mg)	0.45
Protein (g)	5.31	Folate (mcg)	35.58
Carbohydrates (g)	42.34	Folate, DFE (mcg)	48.24
Dietary Fiber (g)	1.20	Vitamin K (mcg)	7.25
Soluble Fiber (g)	0.22	Pantothenic Acid (mg)	0.43
Total Sugars (g)	31.53	Minerals	
Monosaccharides (g)	3.73	Calcium (mg)	54.50
Disaccharides (g)	0.11	Chromium (mcg)	0.20
Other Carbs (g)	9.61	Copper (mg)	0.06
Fat (g)	2.98	Fluoride (mg)	0.00

Nutrients cont.

Nutrients	Per Serving	Nutrients	Per Serving
Saturated Fat (g)	1.00	Iodine (mcg)	13.21
Mono Fat (g)	1.12	Iron (mg)	1.05
Poly Fat (g)	0.45	Magnesium (mg)	7.22
Trans Fatty Acid (g)	0	Manganese (mg)	0.21
Cholesterol (mg)	107.41	Molybdenum (mcg)	3.19
Water (g)	75.94	Phosphorus (mg)	61.23
Vitamins		Potassium (mg)	69.78
Vitamin A - IU (IU)	204.44	Selenium (mcg)	11.30
Vitamin A - RAE (RAE)	35.35	Sodium (mg)	79.06
Vitamin A - Carotenoid RE (RE)	2.80	Zinc (mg)	0.40
Vitamin A - Retinol RE (RE)	33.95	Other Fats	
Beta-Carotene (mcg)	15.58	Omega 3 Fatty Acid (g)	0.04
Vitamin B1 - Thiamin (mg)	0.12	Omega 6 Fatty Acid (g)	0.41
Vitamin B2 - Riboflavin (mg)	0.18	Other Nutrients	
Vitamin B3 - Niacin (mg)	0.86	Gram Weight (g)	127.41
Niacin Equivalents (mg)	1.70	Alcohol (g)	0.18
Vitamin B6 (mg)	0.06	Caffeine (mg)	0
Vitamin B12 (mcg)	0.28	Choline (mg)	65.02
Biotin (mcg)	4.93		

Notes

The texture of this French dessert is between a custard and a cake. Blueberries are used in this version although cherries are the traditional choice, but almost any berry or stone fruit would work.

1. Preheat oven to 350 degrees F (175 degrees C). Lightly grease several hotel pans.

2. Arrange the blueberries over the bottom of the prepared pan. Whisk together the eggs and egg yolk until light and fluffy. Stir in the sugar, and continue whisking until mixture thickens. Whisk in the milk, vanilla extract, sifted flour, and salt, one at a time, until mixture is light and airy. Pour the mixture over the berries to cover evenly.

3. Bake on center rack in preheated oven until top is golden and springs back when touched, about 45 minutes. Cool slightly, and cut into equal pieces. Dust with confectioners' sugar, and serve immediately.

Prep Time: 15 Min Cook Time: 45 Min Ready In: 1 Hr

What Foods are good for My Immune System?

Introduction

Your ability to interact with the world around you and remain healthy is dependent to a large extent on the healthy functioning of your immune system. Your immune system is responsible for fighting foreign invaders to your body, like pathogenic bacteria and viruses, and also for destroying cells within your body when they become cancerous. Poor nutrition has been shown to result in increased infections, to slow healing from injury and infections, and to increase susceptibility to symptoms and complications from immune system dysfunction. Science has shown that immune function often decreases as we age, and recent research suggests this decrease is also related to nutrition and may be slowed or even stopped by maintaining healthy nutrition.

Medical science has established that one of the most important factors in supporting a healthy, balanced immune system is good nutrition. Research studies show that healthy eating can help in keeping your immune system ready and capable of functioning properly when necessary. The World's Healthiest Foods provide the kind of nutrition that supports your immune functions to their fullest, while minimizing the agents that may induce or activate your immune response when it should not be active. Let's take a look at how the World's Healthiest Foods support optimal immune function.

What is my immune system?

Your immune system is like a finely tuned orchestra whose purpose is to defend your body from unhealthy insults from the world around you. Like an orchestra, your immune system contains many different instruments that work harmoniously together with one goal, protecting you from foreign insults that can cause damage to your body. And, like an orchestra, the different parts of your immune system must be present, play their part at the right time, and then stop when they have completed their function. The main parts of your immune system are the immune cells, the structural barriers in your body in which the majority of these cells are localized, and the specific messenger molecules that call the cells to action or tell them to stop.

The cells of your immune system are quite varied, and include the *lymphocytes*, or *T-cells*, which fight invading molecules directly, and the *B-cells*, which form *antibodies* that can respond to invading molecules or toxins. The antibodies produced by the B-cells can bind with a potentially damaging molecule or to the surface of a virus or bacteria, thereby targeting it for removal by other immune cells. Your immune system also includes the *phagocytic cells*, such as *macrophages* and *neutrophils*, which remove the debris created from destroying cells and tissue at the site of an infection.

The cells of your immune system are found circulating in your bloodstream or in the lymph nodes, which are located throughout your body; therefore, the immune cells themselves are spread throughout your tissues and can travel quickly when called upon. This way, your immune system is positioned so that it can minimize the entrance into your body of foreign invaders that can cause infection and disease and can quickly respond to any invaders that do manage to gain entrance into your body.

Your immune system also relies upon specific structures in your body that provide a foundation for defense. The most important structures are the barriers between the inside of your body and the outside. These barriers keep unwanted organisms and molecules from entering your body where they can do damage. Since your skin is in contact with the outside world, it is probably not surprising that your skin is an important barrier; however, it is only one part of your defensive barrier. Your gastrointestinal tract is actually the largest barrier between you and the outside world.

Your immune system also includes molecules called *soluble factors*. These are molecules that can recognize when your barrier has been compromised by a foreign invader or toxin and then try to heal the area of damage and remove the insult from your body rapidly. Factors such as the *complement cascade,* a complex group of proteins, can form an immediate response to an insult. Your immune system also can deploy signaling molecules, which are soluble factors that send messages to the immune cells located further inside the tissue that has been compromised, or into your bloodstream. These messenger soluble factors call immune cells to the site of damage and activate the cells, bringing them in full force to the infected area. These messenger molecules are called *cytokines*.

Your *cytokines* not only signal immune cells to take up action, but they also often promote an inflammatory response. The inflammatory response at a site of infection is one way your body secludes, or walls-off, an infected area. For example, if you have ever had poison ivy, or gotten a rash from eating a food to which you are allergic, you may have noticed the signs of inflammation -- redness and swelling -- surrounding the affected area. So, when we talk about the immune system, it is not one organ; it is really the types of immune cells, structures, and soluble factors, like cytokines, which are present throughout all your organs that constitute the immune system. And, your immune system gets help from your inflammatory response.

Nutritionally supporting your immune system means supporting all these sections in the orchestra.

Maintaining a healthy gastrointestinal barrier is essential for optimal immune function.

Of the physical barriers between your internal organs and the outside world, your gastrointestinal tract is of primary importance. The gastrointestinal tract is like an internal skin, but it has about 150 times more surface than does your outside skin. It also contains the largest number of immune cells of your whole body, constituting approximately 60% of your entire immune system.

It may be surprising that the gastrointestinal tract has more of your immune system localized within it than any other organ in your body; however, it has a very difficult role. Your gastrointestinal tract comes into contact with the largest amount and number of different molecules and organisms of any organ in your whole body. Just as an example, the average person ingests more than 25 tons of food over his or her lifetime.

And, unlike your skin or even your lungs, your gastrointestinal tract must figure out how to keep out damaging molecules and pathogenic organisms, while still letting in the nutrients and food components your body needs to survive. So, it has to be selective in its protection. The gastrointestinal mucosal layer has the unique role of keeping out damaging molecules and organisms, like harmful bacteria and viruses, while allowing in only the health-promoting nutrients, molecules and substances. In a perfect scenario, only the beneficial nutrients and phytonutrients are absorbed into the body, while non-beneficial substances and organisms never make it across this barrier and are excreted from your body.

The foods you eat can provide support for this barrier or cause damage to it. For instance, alcohol consumption is known to irritate the gastric (stomach) mucosal barrier. Some drugs, for example, the non-steriodal anti-inflammatory drugs like aspirin and ibuprofen, also can harm this barrier. Many nutrients in the World's Healthiest Foods help to support a healthy barrier. Foods that are high in *phosphatidylcholine* or its precursor, choline, are particularly beneficial in supporting a healthy gastrointestinal barrier since phosphatidylcholine is one of the components of the protective mucosa that lines your intestinal tract and provides the first barrier defense. Studies have shown that diets low in choline result in low levels of phosphatidylcholine.

Maintaining healthy cells within the tissues that constitute your barriers, including your gastrointestinal tract is also vital for optimal health. Vitamin A plays an important role in supporting the cells of the skin, gastrointestinal tract and lungs - the *epithelial cells* - which constitute the main barriers that separate you from the external environment, plus vitamin A promotes the formation of the protective mucous in your

gastrointestinal tract. Phosphatidylcholine is a component of your cell membranes, and therefore choline-rich foods also support healthy cell membranes. Essential fatty acids, such as those found in cold-water fish, and a healthy range of monounsaturated fatty acids, such as those in olive oil, can also support healthy gastrointestinal cells by promoting healthy membranes.

Finally, foods high in fiber, such as whole, fresh fruits and vegetables, promote a healthy gastrointestinal system in several ways. They are fermented by the friendly bacteria in your colon to short-chain fatty acids (SCFAs), which are used as a fuel by gastrointestinal tract cells. Studies have shown that fibers that promote SCFAs also promote a healthy gastrointestinal barrier. Fiber also promotes the removal of toxins that can adversely affect your gastrointestinal tract cells and supports healthy digestive function overall.

What nutrients support my immune system cells?

Research over the past ten years has shown that nutrition plays a major role in supporting the production and action of both the cells and the soluble factors of the immune system. Protein, antioxidants, essential fatty acids, and certain vitamins, and minerals are all key to a healthy immune system.

Protein and your immune system

Much research has shown that protein malnutrition can have a variety of untoward effects on the immune system. In fact, protein malnutrition may be an important contributing factor in HIV seroconversion (the process by which a person with primary exposure to Human Immunodeficiency Virus becomes infected with that virus). Research studies have show that deficiency of high-quality protein protein can result in depletion of immune cells, inability of the body to make antibodies, and other immune-related problems. In addition, animal studies have shown that the immune system can be significantly compromised with even a 25% reduction in adequate protein intake.

Protein is composed of the 20 amino acids your body needs for growth and repair, and some of these amino acids appear to be particularly important for immune functioning. For example, the amino acids called glutamine and arginine are being considered as nutrition therapy in pre-surgery patients because of their ability to stimulate the immune system. Interestingly, it is not just deficiency of these amino acids that can compromise the immune system, an imbalance in the ratios among amino acids can also affect the immune response.

Therefore, a diet that supports a healthy immune system should contain foods providing high-quality, complete protein, such as that found in eggs, fish, shellfish, and venison. Many vegetables and grains are also excellent sources of many of the immune-stimulating amino acids and, together with other protein sources, are particularly beneficial. The recipes on this web page provide many excellent menus for a meal with complete protein, such as the Baked Seafood with Asparagus, or Poached Fish with Chinese Cabbage.

The essential vitamins for healthy immune function

As discussed above, your body uses a variety of responses to maintain its defense against harmful pathogenic organisms in the environment; therefore, it may not be surprising that nearly all of the vitamins are necessary to maintain and promote some aspect of your immune function. Some vitamins have received more attention in the research literature since they are particularly important to a healthy immune system.

Much has been written about the role of vitamin C in supporting the immune system, in part because it has been promoted as an immune stimulant by the noted scientist and Nobel Prize Laureate, Linus Pauling. Vitamin C appears to support a decrease in the length of time and severity of symptoms associated with upper respiratory viral infections, promote phagocytic cell functions, and support healthy T-cell function. Vitamin C also provides antioxidant activity to support healing at sites of inflammation. An excellent source of vitamin C is

citrus fruit. Many vegetables are also excellent sources of vitamin C, such as fresh parsley, raw cauliflower, mustard greens and Romaine lettuce.

Many of the B-vitamins are also very important in supporting a healthy immune system. For example, vitamin B5 (pantothenic acid) promotes the production and release of antibodies from B-cells, and deficiency of vitamin B5 results in reduced levels of circulating antibodies. Folic acid deficiency leads to a decrease in T-cells and can result in reduced effectiveness of the soluble factors as well. Vitamin B6 deficiency consistently impairs T-cell functioning and results in a decrease in blood lymphocyte counts. Deficiencies in vitamins B1(thiamin) and B2 (riboflavin) may impair normal antibody response, and low vitamin B12 appears to inhibit phagocytic cells and possibly T-cell function.

Almost all whole grains, vegetables and fruits can serve as excellent sources of at least some of these vitamins, but some vegetables are particularly beneficial since they are excellent sources of many of these immune-supporting vitamins. In particular, Romaine lettuce is an excellent source of vitamins B1, B2, C, and folate. Cooked turnip greens and boiled spinach are excellent sources of folate, vitamin B6 and vitamin C. And cooked cauliflower is an excellent source of vitamin C and folate and a very good source of vitamin B5 and B6. Raw crimini mushrooms are also an excellent source of vitamin B2 and vitamin B5. Red bell peppers are an excellent source of vitamin B6. Vitamin B12 can be obtained from protein-providing foods such as fish, shellfish, venison and calf's liver.

The fat-soluble vitamins, vitamin A, vitamin E and vitamin K are also important to overall health. Vitamin A deficiency has been shown to impair antibody function and T-cell activity. Vitamin E is an important antioxidant and supports a healthy inflammatory response. Vitamin E is also an important component of all cell membranes and promotes healthy cellular functioning overall. T-cells and B-cells from vitamin E-deficient animals show depressed responses, and tumors have been shown to grow faster in vitamin-E deficient animals. Vitamin K supports a healthy blood-clotting ability in your body, and this is necessary for seclusion of areas of infections and injury in the healing process. Cooked turnip greens and boiled mustard greens, mentioned above, are also excellent sources of vitamins E and A, as well as boiled Swiss chard. Other excellent sources of vitamin A include many vegetables such as spinach, fresh parsley and carrots. Concentrated sources of vitamin K include raw cauliflower, as well as most green vegetables such as spinach and asparagus.

Minerals that support your immune system

Zinc is one of the minerals in food that has received the most attention for its ability to support immune function. Zinc is a potent immunostimulant, and its deficiency can result in profound suppression of T-cell function. Children with severe zinc deficiencies show signs of growth retardation and susceptibility to infections. However, an excess of zinc has also shown negative effects on immune function and can inhibit the *phagocytic cells* (*macrophages* and *neutrophils*). So, maintaining adequate but not excessive levels of zinc is important. This is one reason food is such an excellent source of obtaining nutrition versus supplementation; food contains a balanced variety of the micronutrients whereas supplementation with individual nutrients can lead to too much of some and not enough of others. Healthy levels of zinc can be provided by including the good sources of zinc, such as boiled Swiss chard, collard greens, and both summer squash and winter squash, or the very good or excellent sources of zinc like lamb, raw crimini mushrooms and calf's liver in your diet.

Many other minerals are important in supporting immune function. Clinical research studies have shown that iron deficiency results in impaired response to antibodies, and defective phagocytic cell functioning. Copper deficiency is associated with an increase in infections and may impair development of immune cells such as T-cells and the phagocytic cells. Selenium and manganese are important for supporting healing from inflammation and may be immunostimulants. Selenium can be obtained from fish and shellfish, as well as tofu and whole grains. Excellent sources of copper are turnip greens, calf's liver and raw crimini mushrooms, and very good sources include spinach, asparagus and summer squash and boiled Swiss chard. Iron can be provided by fresh

parsley, spices such as thyme or cinnamon, tofu, beans and peas, and many other vegetables such as spinach and Romaine lettuce.

Antioxidants and phytonutrients that promote healthy immune function

Reactive oxygen species, free radicals and other damaging molecules are generated at sites of infection and inflammation. Your body needs these molecules at the site of infection to help kill unhealthy cells; however, when your antioxidant systems are not functioning, or when not enough antioxidants are present in your diet, these molecules are not disarmed after they have done their jobs and can become damaging to healthy tissue as well. Many fruits and vegetables provide antioxidants and phytonutrients that help maintain healthy tissue around the sites of infection and support healing. Fruits and vegetables, especially colored foods like strawberries, cherries, carrots, and tomatoes contain many beneficial phytonutrients with antioxidant potential. More detailed information on the health benefits of phytonutrients can be obtained from the FAQ: "What is the Special Nutritional Power Found in Fruits and Vegetables".

Are there foods that are bad for my immune system?

Your immune system is not just involved in fighting invaders like bacteria, but also becomes activated when you eat foods to which you are intolerant or allergic. Reactions to allergic foods can be quick, like the anaphylactic reaction often seen with peanut or shellfish allergies, but food allergy reactions can also be delayed and cause a number of symptoms like headaches, fatigue, muscle aches, rashes and other systemic (whole body) effects. The most common allergenic foods include peanuts and shellfish, cow's milk, wheat, and soy; however, everyone is unique in their food intolerances and allergies.

Processed foods and foods produced with pesticides or not grown organically may also be problematic for your immune function. Toxic metals such as cadmium, lead and mercury are immunosuppressive. Some pesticides and preservatives can negatively effect the gastrointestinal lining. Food additives can also have untoward effects on the nutrient content of the food. For example, sulfites destroy thiamin-vitamin B1 in foods to which they have been added.

How do I keep a healthy "balance" in my immune system?

Your immune system is developed to be able to kill cells, such as bacteria cells or viruses; your immune cells can act against cancer cells within your body as well if it is able to tell that these cells are unhealthy to you. However, without proper control and the ability to differentiate healthy from unhealthy cells, your immune system can mistakenly kill your own healthy cells. Your inflammatory response is also developed to support healing, but when this response becomes overly active, it can become destructive. Autoimmune system diseases like rheumatoid arthritis and multiple sclerosis, susceptibility to infections, and wounds that won't heal are some of the repercussions of immune system imbalance and dysfunction. Therefore, healthy immune and inflammatory responses must maintain a delicate balance to achieve protection without causing self-destruction.

Your body has a complex means of recognition on your cells' membranes to help your immune system. Some specific soluble factors of your immune system are also involved in turning-off your immune response. How well these responses function is defined in part by your genes; however, recent research has suggested that diet plays a much larger role in autoimmune system dysfunction than was once thought. For example, research has shown an association with low levels of vitamin D and increased risk of some autoimmune diseases, such as multiple sclerosis. Concentrated sources of vitamin D include cow's milk eggs and shellfish such as shrimp and fish such as cod.

The omega-3 fatty acids, which are produced in your body from the essential omega-3 fat - alpha-linolenic acid - have been studied for their effects on the immune system and inflammatory response. Diets low in omega-3

fatty acids are associated with chronic inflammatory conditions and autoimmune diseases. In order to achieve a more beneficial ratio of omega-3 fatty acids in your body, it is important to decrease the amount of omega-6 fatty acids in your diet, while increasing the amount of omega-3 fatty acids. This can be accomplished by reducing your consumption of meats, dairy products, and refined foods, while increasing consumption of the omega-3 rich foods such as wild-caught cold-water fish like salmon, flaxseed oil, walnuts, and leafy green vegetables.

Weight-management, nutrient-dense foods and the immune system

Research and clinical observations suggest that obesity is associated with immune dysfunction. For example, increases in the incidence of infectious illness and infection-related mortality are found in obese people. An increase in inflammation has also been seen with an increase in weight in individuals. Some studies have shown an association between high cholesterol and susceptibility to infections as well. Therefore, maintaining a healthy weight and healthy cholesterol levels may also be beneficial to your immune system's functioning.

Eating nutrient-dense whole foods is one way to provide your body with the full spectrum of nutrients it needs while keeping calorie intake to a healthy level. The World's Healthiest Foods are analyzed for their nutrient density. Foods such as cooked turnip greens, boiled Swiss chard, raw crimini mushrooms, boiled mustard greens, boiled asparagus and Romaine lettuce provide a broad spectrum of the key micronutrients that support healthy immune function and are therefore recommended as part of an immune-enhancing diet.

What can I do to support and maintain a healthy immune system?

- Provide support for the physical barriers in your body.
- Support a healthy digestive process. In particular, the acidic environment provided in your stomach and the presence of digestive enzymes can destroy some bacteria and viruses that you ingest in food, and therefore, provides protection for your body.
- Consume adequate protein and healthy fats.
- Provide for balanced immune and inflammatory functions. Clinical studies have shown that maintaining a healthy balance between omega-3 and omega-6 fatty acids is one way to support balance in your immune and inflammation responses system. Research indicates a ratio of omega-3 to omega-6 fats of 1:4 is health-promoting.
- Provide micronutrients and phytonutrients that support healthy immune function.
- Decrease intake of allergens and toxins. Eating whole grains, fresh, organically grown fruits and vegetables, wild-caught fish, and meat and eggs from organically raised animals is one way to minimize the intake of toxins and unhealthy molecules that can inhibit your immune system's ability to protect your health.
- Maintain healthy weight and cholesterol levels. Basing your diet on nutrient-dense foods, such as those found in the World's Healthiest Foods nutrient-dense food list, is one way to decrease calorie consumption while consuming optimal levels of micronutrients and immune-supporting phytonutrients.

References

- Beck MA. Antioxidants and viral infections: host immune response and viral pathogenicity. J Am Coll Nutr. 2001;20(5):384S-388S 2001. PMID:11603647.
- Blusztajn JK. Choline, a vital amine. Science. 1998;281:794-795 1998.
- Calviello G, Palozza P, Maggiano N, et al. Cell proliferation, differentiation, and apoptosis are modified by n-3 polyunsaturated fatty acids in normal colonic mucosa. Lipids. 1999;34:599-604 1999.
- Cunningham-Rundles S. Analytical methods for evaluation of immune response in nutrient intervention. Nutr Rev. 1998;56:S27-S37 1998.

- Delneste Y, Donnet-Hughes A, Schiffrin EJ. Functional foods: mechanism of action on immunocompetent cells. Nutr Rev. 1998;56:S93-S98 1998.
- Fernandes G, Jolly CA. Nutrition and autoimmune disease. Nutr Rev. 1998;56:S161-S169 1998.
- Grimble RF. Nutritional modulation of cytokine biology. Nutrition. 1998;14:634-640 1998.
- Grimm H, Kraus A. Immunonutrition – supplementary amino acids and fatty acids ameliorate immune deficiency in critically ill patients. Langenbeck Arch Surg. 2001;386:369-376 2001.
- Huston DP. The biology of the immune system. JAMA. 1997;278:1804-1814 1997.
- Inserra PF, Ardestani SK, Watson RR. Antioxidants and immune function. In: Antioxidants and Disease Prevention. Garewell H, ed. CRC Press. 1997:19-29 1997.
- Kelley DS. Modulation of human immune and inflammatory responses by dietary fatty acids. Nutrition. 2001;17:669-673 2001. PMID:11448594.
- Kelley DS, Bendich A. Essential nutrients and immunologic functions. Am J Clin Nutr. 1996;63:994S-996S 1996.
- Munoz C, Schlesinger L, Cavaillon J-M. Interaction between cytokines, nutrition and infection. Nutr Res. 1995;15:1815-1844 1995.
- O'Flaherty L, Bouchier-Hayes DJ. Immunonutrition and surgical practice. Proc Nutr Soc. 1999;58:831-837 1999.
- Sakamoto M, Fujisawa Y, Nishioka K. Physiologic role of the complement system in host defense, disease, and malnutrition. Nutrition. 1998;14:391-398 1998.
- Sampson HA. Food hypersensitivity: manifestations, diagnosis, and natural history. Food Tech 1992;May:141-44 1992.
- Schloerb PR. Immune-enhancing diets: products, components, and their rationales. J Parenteral Enteral Nutr. 2001;25:S3-S7 2001.
- Stephensen CB. Examining the effect of a nutrition on intervention on immune function in healthy humans: what do we mean by immune function and who is really healthy anyway. Am J Clin Nutr. 2001;74:565-566 2001. PMID:11684519.
- Takahashi I, Kiyono H. Gut as the largest immunologic tissue. J Parenteral Enteral Nutr 1999;23:S7-S12 1999.
- Walrand S, Moreau K, Caldefie F, et al. Specific and nonspecific immune responses to fasting and refeeding differ in healthy young adult and elderly persons. Am J Clin Nutr. 2001;74:670-678 2001.

Organic food: Is it worth the extra money?

Even though you wash your fruits and vegetables, some still contain pesticide residue. Nutritionist Joy Bauer tells you what to buy:

Almost two-thirds of American consumers bought some type of organic food or beverage last year, up from about half in 2004. And they usually spend about 50 percent or 100 percent more for these organic products. But is it worth it? Yes and no. The U.S. Department of Agriculture has found that even after you wash certain fruits and vegetables, they still contain much higher levels of pesticide residue than others. This includes apples, berries, grapes, spinach, and potatoes. On the other hand, that's not true for bananas, mangos, or corn. Here are some facts to help you decide what organic, or natural, foods you should buy:

What organic means:

- Animals have *not* been treated with: antibiotics, growth hormones, or feed made from animal byproducts.
- Animals must have been fed organic feed for at least a year.
- Animals must have access to the outdoors.
- Food hasn't been genetically modified or irradiated.
- Fertilizer does not contain sewage sludge or synthetic ingredients.
- Produce hasn't been contaminated with synthetic chemicals used as pesticides.

What the labels mean:

- "100% Organic": Product must contain 100 percent organic ingredients.
- "Organic": At least 95 percent of ingredients are organically produced.
- "Made with Organic Ingredients": At least 70 percent of ingredients are organic. The remaining 30 percent must come from the USDA's approved list.
- "Free-range" or "Free-roaming": Misleading term applied to chicken, eggs and other meat. The animal did not necessarily spend a good portion of its life outdoors. The rule states only that outdoor access be made available for "an undetermined period each day." U.S. government standards are weak in this area.
- "Natural" or "All Natural": Does *not* mean organic. There is no standard definition for this term except with meat and poultry products. (USDA defines "natural" as not containing any artificial flavoring, colors, chemical preservatives, or synthetic ingredients). The claim is not verified. The producer or manufacturer alone decides whether to use it.

The "Dirty Dozen": Must-buy organic foods

Fruit

- Apples
- Cherries
- Grapes, imported (Chili)
- Nectarines
- Peaches
- Pears
- Raspberries
- Strawberries

Vegetables

- Bell peppers
- Celery
- Potatoes
- Spinach

The U.S. Department of Agriculture found that even after washing, some fruits and vegetables consistently carry much higher levels of pesticide residue than others. Based on an analysis of more than 100,000 U.S. government pesticide test results, researchers at the Environmental Working Group (EWG), a research and advocacy organization based in Washington, D.C., have developed the "dirty dozen" fruits and vegetables, above, that they say you should always buy organic, if possible, because their conventionally grown counterparts tend to be laden with pesticides. They cost about 50 percent more — but are well worth the money.

Other organic foods worth considering:

- Milk
- Beef
- Poultry

Reduce the risk of exposure to the agent believed to cause mad cow disease and minimize exposure to other potential toxins in non-organic feed. These foods contain *no* hormones, and antibiotics — which have been linked to increased antibacterial resistance in humans — have *not* been added to the food. In the past they have often cost 100 percent more than conventional products, but with the increase in demand are now much more reasonable.

No need to go organic with these foods:

Fruit

- Bananas
- Kiwi
- Mangos
- Papaya
- Pineapples

Vegetables

- Asparagus
- Avocado
- Broccoli
- Cauliflower
- Corn
- Onions
- Peas

These products generally do not contain pesticide residue.

Seafood

Wild or farmed fish can be labeled organic, despite the presence of contaminants such as mercury and PCBs. No USDA organic certification standards for seafood — producers are allowed to make their own organic claims.

Managing the high cost of organic foods:

Why does organic cost more?

Growing the food is more labor-intensive. And even though organic food is a growing industry, it doesn't have the economies of scale or government subsidies available to conventional growers.

How to save money buying organic food:

- Comparison shop in local grocery stores.
- Take advantage of local farmers' markets: Many farmers do not charge a premium.
- Order by mail: Products such as organic beef can be shipped nationally.

How to protect yourself from "non-organic" pesticides:

Produce

- Buy fresh vegetables and fruits in season. When long storage and long-distance shipping are not required, fewer pesticides are used.
- Trim tops and the very outer portions of celery, lettuce, cabbages, and other leafy vegetables that may contain the bulk of pesticide residues.
- Peel and cook when appropriate, even though some nutrients and fiber are lost in the process.
- Eat a *wide variety* of fruits and vegetables. This would limit exposure to any one type of pesticide residue.
- Purchase only fruits and vegetables that are subject to USDA regulations. Produce imported from other countries is not grown under the same regulations as enforced by the USDA. Examples are strawberries and cantaloupes from Mexico.
- Wait until just before preparation to wash or immerse your produce in clean water. When appropriate, scrub with a brush. Experts at the University of California-Berkeley report that this removes nearly all insects and dirt, as well as bacteria and *some* pesticide residues.
- Special soaps or washes are not needed and could be harmful to you, depending on their ingredients. Read the label! Cold water is perfectly fine.

Meats/poultry/fish:

- Trim the fat from meat, and fat and skin from poultry and fish. Residues of some pesticides concentrate in animal fat.

How to Store Fresh Produce for Best Results and Longest Life

If your produce rots after just a few days, you might be storing incompatible fruits and veggies together. Those that give off high levels of ethylene gas—a ripening agent—will speed the decay of ethylene-sensitive foods. Keep the two separate.

Use trapped ethylene to your advantage: To speed-ripen a peach, put it in a closed paper bag with a ripe banana. One bad apple really can spoil the whole bunch. Mold proliferates rapidly and contaminates everything nearby, so toss any spoiled produce immediately.

For longer life, keep your produce whole—don't even rip the stem out of an apple until you eat it. "As soon as you start pulling fruits and vegetables apart (says Barry Swanson, a food scientist at Washington State University), you've broken cells, and microorganisms start to grow." Cold-sensitive fruits and veggies lose flavor and moisture at low temperatures. Store them on the counter, not in the fridge. Once they're fully ripe, you can refrigerate them to help them last, but for best flavor, return them to room temp.

Never refrigerate potatoes, onions, winter squash or garlic. Keep them in a cool, dark, dry cabinet, and they can last up to a month or more. But separate them so their flavors and smells don't migrate.

The ABCs of Fresh

"The main way to lengthen shelf life is by using cold temperatures to slow food's respiration, or 'breathing' process," explains Marita Cantwell, PhD, a postharvest specialist at the University of California, Davis. In general, the warmer the temperature, the faster the rate of respiration, which is why refrigeration is critical for most produce. But while you want to slow it down, you don't want to stop the breathing altogether. "The worst thing to do is seal fruits and vegetables in an airtight bag," says Barry Swanson, a food scientist at Washington State University. "You'll suffocate them and speed up decay."

Some fruits emit ethylene, an odorless, colorless gas that speeds ripening and can lead to the premature decay of nearby ethylene-sensitive vegetables. Put spinach or kale in the same bin as peaches or apples, and the greens will turn yellow and limp in just a couple of days. So the first trick is to separate produce that emits ethylene from produce that's sensitive to it.

REFRIGERATE THESE GAS RELEASERS:	***DON'T REFRIGERATE THESE GAS RELEASERS:***	***KEEP THESE AWAY FROM ALL GAS RELEASERS:***
Apples	Avocados	Bananas, ripe
Apricots	Bananas, unripe	Broccoli
Cantaloupe	Nectarines	Brussels sprouts
Figs	Peaches	Cabbage
Honeydew	Pears	Carrots
	Plums	Cauliflower
	Tomatoes	Cucumbers
		Eggplant
		Lettuce and other leafy greens
		Parsley
		Peas
		Peppers
		Squash
		Sweet potatoes
		Watermelon

At least as important as how you store produce is when you buy it. Do all of your other shopping first so that your berries and broccoli don't get warm—and respire rapidly—while you're picking up nonperishable items. Get the produce home and into the fridge as soon as possible. If you'll be making several stops between the market and kitchen, put a cooler in the car. Shop farmers' markets soon after they open: Just-harvested greens wilt rapidly once they've been in the sun for a few hours.

Even under optimal conditions, fragile raspberries will never last as long as thick-skinned oranges. Eat more perishable items first (see "Fastest to Slowest Spoilers" sidebar). And if you still find yourself with a bushel of ripe produce—and a business trip around the bend—improvise. Make a fruit pie, a potful of soup or a great big vat of tomato sauce, and throw it in the freezer. You'll relish your foresight when you get home.

Fastest to Slowest Spoilers: What to Eat First

You can enjoy fresh fruits and vegetables with just a single weekly trip to the supermarket, with proper storage and a little planning.

The key is eating the more perishable produce early on. Use this guide which is based on a Sunday shopping trip. The timing suggestions are for ready-to-eat produce, so allow extra days for ripening if you're buying, say, green bananas or not-quite-ripe pears.

And remember, looks count. Appearance—vivid green spinach; smooth, unbruised peaches; plump oranges—is the best clue to whether fruits and veggies are fresh to begin with.

Eat First: Sunday to Tuesday	Eat Next: Wednesday to Friday	Eat Last: Weekend	And Beyond…
Artichokes	Arugula	Apricots	Apples
Asparagus	Cucumbers	Bell peppers	Beets
Avocados	Eggplant	Blueberries	Cabbage
Bananas	Grapes	Brussels sprouts	Carrots
Basil	Lettuce	Cauliflower	Celery
Broccoli	Lime	Grapefruit	Garlic
Cherries	Mesclun	Leeks	Onions
Corn	Pineapple	Lemons	Potatoes
Dill	Zucchini	Mint	Winter squash
Green beans		Oranges	
Mushrooms		Oregano	
Mustard greens		Parsley	
Strawberries		Peaches	
Watercress		Pears	
		Plums	
		Spinach	
		Tomatoes	
		Watermelon	

Meals for Many

August 11th, 2010

A meal provider training sponsored by Meals Partnership Coalition and this year hosted by Seattle's Union Gospel Mission

Meals Partnership Coalition
P.O. Box 4128
Seattle, WA 98194

Ph. (206) 957-3857 info@mealspartnership.org

Section 3 – Environmental Food Safety

MONTHLY SELF INSPECTION REPORT

Name:_____ Establishment Name: _____

Establishment Address:_____

Phone:_____ Report Month/Year: _____

Submit a copy of the self inspection checklist, noting any problems or concerns, along with the action you have taken. In addition complete the following information:

- **Temperatures**: **Comments:**

  My thermometer reads ___°F in ice water.
  How often do you calibrate your thermometer(s)? _____
  Do you keep daily temperature logs? _____

- **Cold holding temperatures**:

Temperatures	Morning	Midday	End of Day
Refrigerator #1	ºF	ºF	ºF
Refrigerator #2	ºF	ºF	ºF
Refrigerator #3	ºF	ºF	ºF
Refrigerator #4	ºF	ºF	ºF

  How often do you check cold holding temperatures?_____

- **Hot holding**:

  Potentially hazardous foods are held at _____ °F to _____ °F on the steam table or in the hot holding equipment.

  How often do you check hot holding temperatures? _____

  List the temperatures of several foods in hot holding:

  _____ _____

  _____ _____

- **Handwashing**:

  All handwashing facilities are maintained with warm water (100-120°F) and **reserves** of soap and paper towels are always on hand. Yes_____

- **Employees**:

  I do _____ I do not _____ hold regular and frequent meetings with my employees to train and update them on important topics in food sanitation.

  Proper utensils (tongs, spoons, scoops, waxed paper, disposable gloves) are provided to minimize direct hand contact with ready-to-eat foods. Yes _____

Self Inspection Checklist

YES/NO		KNOWLEDGABLE HEALTHY EMPLOYEES	COMMENTS:
☐	☐	All employees have their Food Worker Card	
☐	☐	All employees are prohibited from eating or smoking in food preparation areas	
☐	☐	No ill food workers present	
☐	☐	Person in charge present at all times kitchen is in operation	
		SAFE FOOD FROM APPROVED SOURCES	
☐	☐	All foods used in the establishment are from approved sources	
☐	☐	All deliveries are examined for potential contamination (insects, pests, chemicals, etc.)	
☐	☐	All food in storage is dated with the date received or the date prepared	
☐	☐	No spoiled food is stored in the establishment	
☐	☐	Raw fruits and vegetables properly washed	
		PROTECT FOOD FROM CONTAMINATION	
☐	☐	Food contact surfaces are sanitized between uses	
☐	☐	All employees wash their hands after handling raw products	
☐	☐	Raw meat (seafood, poultry, etc.) is stored over nothing but raw meat	
☐	☐	Handwashing facilities are maintained with soap and paper towels	
☐	☐	All employees wash their hands before starting work	
☐	☐	Employees wash their hands twice after using the toilet, first in the bathroom; second at the kitchen handwash sink	
☐	☐	Employees wash their hands after coughing, sneezing, handling raw meats, handling garbage or otherwise contaminating their hands	
☐	☐	Food service establishment has an employee illness policy	
☐	☐	All toxic and poisonous chemicals are stored in their original container or in containers labeled with the ingredients and first aid requirements	
☐	☐	Material Safety Data Sheet is posted near chemicals.	
☐	☐	Acid foods are stored in glass or stainless steel and never in glazed pottery or galvanized containers	
☐	☐	Food workers use proper utensils (tongs, spoons, scoops, waxed paper, disposal gloves) to minimize direct hand contact with ready-to-eat foods	
☐	☐	Food workers who need to use disposable gloves to minimize bare hand contact must do the following: change gloves frequently especially between tasks by disposing of gloves, washing hands, and putting on new gloves.	
		PREPARING SAFE FOOD	
☐	☐	Frozen potentially hazardous foods with a food depth or thickness greater than four (4) inches is properly thawed prior to cooking	
☐	☐	All employees are trained in proper cooling techniques	
☐	☐	All potentially hazardous foods are cooled to 70° or less within two hours and to 41° or less within four additional hours of removal from the heat source	
☐	☐	Thermometers are used to determine food temperatures	
☐	☐	Temperature charts are kept for cooling foods	
☐	☐	All potentially hazardous foods requiring preparation but not scheduled for immediate cooking are made from chilled ingredients and are refrigerated after mixing	
☐	☐	Inadequate refrigeration space (a serious problem) is documented	
☐	☐	All employees are trained in proper hot holding techniques	
☐	☐	Potentially hazardous foods are maintained at 140° or above while in hot holding	
☐	☐	All employees know the proper cooking temperatures	

Self Inspection Checklist

YES/NO			
		PREPARING SAFE FOOD	**COMMENTS:**
☐	☐	Thermometers are used to measure final cooking temperatures	
☐	☐	All cook/chill potentially hazardous foods are reheated to 165° or above	
☐	☐	Frozen foods larger than three pounds are thawed prior to cooking	
☐	☐	Daily HACCP temperature logs kept	
☐	☐	Fruits and vegetables are heated to 140° before being placed into hot holding.	
		FOOD PROTECTION	
☐	☐	All food is protected from contamination at all times	
☐	☐	Food is stored at least six inches off the floor	
☐	☐	Food is thawed in the refrigerator or under cool running water	
☐	☐	Dispensing utensils, when in use, are stored in the product, in a running water dipper well or clean and dry	
☐	☐	All sanitized equipment is stored in a way that will prevent its contamination	
☐	☐	Proper consumer advisory on menu, label, or sign of unpasteurized juice or raw or undercooked meats, eggs, and aquatic foods	
		CLEANING	
☐	☐	Warewashing is done correctly	
☐	☐	The mechanical dishwasher is sanitizing as required	
☐	☐	All wiping cloths are kept in a sanitizing solution between uses	
☐	☐	All food contact surfaces are sanitized as required	
☐	☐	Non-food contact surfaces are clean	
		SANITARY FACILITIES	
☐	☐	Hot water is available and at the required temperature	
☐	☐	Floor sinks are cleaned regularly	
☐	☐	Toilet facilities are maintained	
		GARBAGE	
☐	☐	Garbage is handled in a way that eliminates <u>all</u> problems	
		PEST CONTROL	
☐	☐	Insects are controlled	
☐	☐	Pesticides are used and stored as per label directions	
		MAINTENANCE	
☐	☐	Floor, walls and ceiling are clean and in good repair	
☐	☐	Hood and hood vents are clean	
☐	☐	Unnecessary equipment has been removed from the establishment	

A-BEN-A-QUI www.nhcleansource.com

Non-Toxic, Environmentally-Safe Universal Cleaner

A-BEN-A-QUI, an environmentally safe multipurpose paste, cleans and polishes any hard surface inside the home or office. Unlike many conventional cleaning products, our versatile product quickly, effectively and safely cleans any stubborn stain without bleach, solvents or fumes. Furthermore, **A-BEN-A-QUI** won't leave harmful residues and is safe for the environment.

ENVIRONMENALLY SAFE ATTRIBUTES:

* Non-hazardous
* Non-poisonous
* Non-toxic
* Non-flammable
* Non-corrosive
* Contains no VOCs
* Contains no petroleum
* Manufactured with bio-based ingredients

BEST FOR USE ON:

* Stainless Steel
* Porcelain
* Fiberglass
* Aluminum
* Metal
* Vinyl
* Grout
* Tile
* Plastic
* Ceramic

REMOVES:

* Soap Scum
* Grout Stains
* Ink Marks
* Graffiti
* Scuff Marks
* Permanent Marker
* Hard Water Marks
* Rust Stains
* Food and Coffee Stains

Environmentally Safe Alternative to:

* Ajax
* Comet
* Soft Scrub

Independently Certified By:

* Chlorine Free Products Association
www.ChlorineFreePorducts.org

Endorsed By:

* Grassroots Environmental Child Safe Products Guidelines
"Surpassing Green Seal Standards"
www.GrassrootsInfo.org

What Is TANCS®?

With Thermo Accelerated Nano Crystal Sanitation (TANCS®), your Ladybug 2200S, Ladybug XL2300, or Ladybug Tekno 2350 will use the naturally occurring minerals in tap water to form crystals. As these crystals pass through the boiler they gain energy from the heat. Then, when the water transforms into super-heated low-moisture steam, these energized crystals are accelerated along with the steam. This process helps disrupt the cell membrane, allowing lethal temperatures to quickly destroy the germs. This activity is confined to the surface being treated or cleaned and is lethal for germs and yet safe for you!

With the TANCS® option, the system qualifies as a disinfection device for the US EPA, in addition to extending the life of the entire system.

A New Level Of Clean

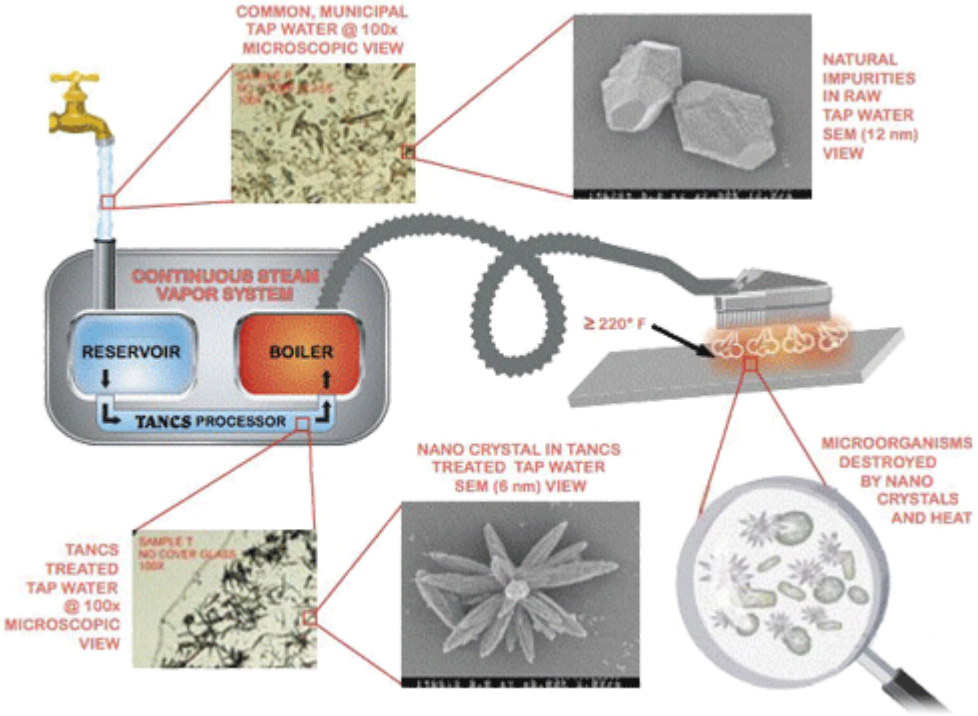
For years, bleach (sodium hypochlorite) has been mistakenly associated with an absolutely clean and disinfected surface. Today, scientists are becoming more aware of the limitations of chemical disinfectants and sanitizers. Recent studies investigating biofilms (microbe colonies present on many pieces of food processing equipment, for example) reveal that 60 minutes of exposure to bleach leaves as many live cells as dead cells in the biofilm matrix. This leads to rapid recolonization of the surface.

Studies show that sufficient heat as is present in the TANCS® steam vapor system will travel through the biofilm and kill the cells that are unreachable by the surface application of a germicide. All without degrading the surface you're cleaning or impairing the air you're breathing while you're doing it!

Benefits of TANCS® technology:

- Results are dramatic and virtually immediate.
- Because the process is so effective, results last longer between cleanings.
- Steam vapor reaches into microscopic pores where topical chemical applications and scrubbing would never reach.
- Savings in time and effort.
- Simplification of cleaning protocols— no disinfectant mixing, storage, disposal concerns, lengthy dwell time requirements, or confusing label directions.
- Elimination and control of the biofilms that resist typical disinfectants.
- Reduced chemical exposure risks.
- Destruction of embedded bacteria and germs that cause lingering odor with traditional cleaning methods.
- Minerals are utilized by TANCS® instead of building up on internal components. The resulting elimination of scale allows for an extended warranty on the steam boiler.
- Disinfecting powers reach far beyond what you can see.

TANCS® Demonstration



MAKING FOOD AND WATER SAFER THAN EVER BEFORE WITH OZONE

By Michael Cutler, M.D. for Pacific Ozone

The method of sanitizing America's water supply is becoming a hot topic—especially for the city of Los Angeles, California. On December 15, 2005 the Metropolitan Water District of Southern California announced their official move to replace its chlorination water treatment system with a massive ozone system, to the tune of $3.5 billion.

The use of ozone has penetrated the food industry as well. By law, every grocery store, restaurant, bar, and all other commercial food suppliers are obligated to disinfect food sources from harmful bacteria, viruses, and a host of parasitic microbes before they sell it. Ozone is proving to be the best technology available and is gradually replacing older methods for many cleaning applications.

This paper explains what ozone is, its safety in health and medicine, and what organisms it effectively kills. Then the details of how ozone is used to purify our public drinking water and susceptible foods are explored. A brief comparison of ozone to chlorination is presented. Then, relatively new research showing ozone's ability to neutralize hazardous environmental chemicals is revealed. You'll learn how industry has discovered the secrets of reproducing this amazing natural cleaner for our more common daily uses.

What is Ozone?

You've no doubt heard of the stratosphere, also called the 'ozone layer' in our earth's atmosphere. That's where potentially harmful ultraviolet light is dampened—where certain shorter wavelengths of sunlight are filtered out for our safety. Ozone, found plentifully at 50 to 75 miles above the earth's surface, is a naturally occurring molecule, which also cleanses the atmosphere as it recycles particulate matter around the earth. It is a colorless gas at room temperature and has an odor like fresh rain on the earth.

But what is it chemically? Ozone is nothing more than three oxygen molecules electrically bound together. Unlike the stable oxygen you breathe (O2), ozone is unsteady and very ready to react to germs, viruses, and a host of microbes that are known to cause illness.

Ozone is generated naturally from oxygen in the air by electrical discharges such as lightning and by high-energy electromagnetic radiation. However, in order to harness this natural cleaning agent for commercial uses, ozone must be produced on-site when it is needed. It cannot be conveniently purchased by the gallon or by the pound. It is generated in small tanks or large robust generators when oxygen (O2) is charged with high voltage electricity. This is because ozone lasts only about 20 to 30 minutes in distilled water at 20 degrees Centigrade, and less time if contaminants are present.

The primary process used commercially today to make ozone is called electrical discharge, or corona discharge. This is the preferred method for the water treatment industry. In this process, a high voltage electrical spark is fired across a gap (like a spark plug) to turn oxygen into ozone. The other products formed in the process must be destroyed through various mechanisms, all of which are done safely and efficiently as part of the ozone generation process.

Once ozone has done its damage to impurities, it naturally converts back to O2, or stable oxygen. It is now clearly proven to be a powerful yet refreshing cleaning agent with end products that supply the earth with the oxygen we breathe—without carcinogenic chemical residues as occurs with chlorination. The fact is ozone is the strongest of all molecules available for disinfection in water treatment.

How safe is ozone?

For many years the ozone was feared because it was used in high concentrations and safety measures were quite loose. Some studies were aimed at portraying ozone as a dangerous substance; they showed how breathing it constantly could cause a chronic bronchitis effect. But today's safety standards have made ozone generators extremely safe and desired for sanitation by nearly every food and water-related industry. In fact, ozone is health promoting, such that it is even being used in medicine for several applications. It reduces the immune hypersensitivity of asthma while promoting the healing effect of natural anti-oxidants, according to an article in the September 2005 *Archives of Medical Research*.

Another use in medicine is that is has been shown to be superior to antibiotic treatments for infected diabetic foot ulcers. The authors of this medical journal article reported in the September 2005 *European Journal of Pharmacology* pointed out that not only was its efficacy superior to antibiotic treatment, it also proved to be without adverse effects—something antibiotics certainly can't claim. And because it has an oxygenating effect, ozone is able to aid in the reversal of cancer and therefore is being used along with chemotherapy and radiation therapy, according to a pilot study published in the June 2004 issue of *Evidence Based Complementary and Alternative Medicine*. To emphasize ozone's beneficial effect in medicine, one researcher at the University of Siena, Italy stated in his commentary in 2004 that "During the past decade, contrary to all expectations, it has been demonstrated that the judicious application of ozone in chronic infectious diseases, vasculopathies (blood vessel disorders), orthopedics and even dentistry has yielded such striking results that it is deplorable that the medical establishment continues to ignore ozone therapy."

What Microorganisms can Ozone treat?

Water safety problems that have formerly been addressed with acid, peroxide, chlorine or other oxidants are now prime candidates for ozone treatment. And if ozone cannot effectively treat a water quality problem, it's likely that no other available oxidant could do the job either. There is quite a long list of microorganisms that ozone effectively kills without hurting the food or surface where they reside.

But to summarize the list, the following are categories of contaminants that can all be treated with ozone:

- Bacteria—all known
- Fungi and yeast—all known
- Protozoa (including parasites and amoebae)—all known.
- Its effectiveness against Cryptosporidium has some limitations, yet is still the most effective of all known sanitation agents for this organism.

In general, ozone is used commercially to:

- Disinfect water before it is bottled
- Kill bacteria, yeast and protozoa on food-contact surfaces such as fresh fruits, vegetables, grains, seeds, nuts, legumes, and all animal meats
- Kill yeast and mold spores that float in the air in food processing plants
- Chemically attack (oxidize) impurities in water such as iron, arsenic, hydrogen sulfide, nitrites and organic clumps
- Oxidize and degrade many organic pollutants including pesticides, herbicides and other persistent environmental chemicals as explained below

Ozone to Disinfect Food and Water

Did you know that ozone has been used by the European food industry as a standard for decades, and as a sanitizer for their public water for over a century? As newer studies are asserting its superior disinfecting capability, the U.S. is adopting ozone in a wide variety of uses. Take Los Angeles, California for example. On December 15, 2005 the Metropolitan Water District of Southern California officially announced it is replacing its chlorination water treatment system with a massive ozone system—to the tune of $3.5 billion. The first two of five water treatment plants have already made the switch, with plans to complete the others by 2010. Soon, the entire city of Los Angeles will be dumping its current chlorination system and sanitizing its water instead with ozone.

Not only does ozone have superior qualities over chlorination for water treatment, its application for cleaning and sanitizing foods of many types deserves discussion here. For disinfecting foods, ozone is used to sanitize surfaces of vegetables, fruits, and other agricultural products. In June 2001 the Food and Drug Administration's final ruling published in their Federal Register, approved ozone as an additive to kill food-borne pathogens "as an antimicrobial agent on food, including meat and poultry." This also included the use of ozone on the treatment, storage, and processing of foods and even the preparing, packing, or holding of raw agricultural commodities for commercial purposes. This came almost as an imperative from the FDA, as ozone has been compared in government reports to other less favorable methods of food cleaning such as the use of hydrogen peroxide, UV light irradiation, peracetic acid, and bromination.

In order to disinfect organisms, ozone must come in physical contact with them. But it only takes ozone a few seconds of contact time to destroy pathogens. In fact, no pathogen can survive 1.5 milligrams of ozone per liter for 5 minutes at normal drinking water pH and temperatures.

Consider how many uses ozone has on fruits and vegetables. It is ideal for cleaning and sanitizing fresh produce directly plus it can be sprayed on all the equipment and surfaces where foods are packaged or processed. It can then be sprayed on walls and floors of storage areas and active processing areas to kill and remove bacteria or other organic matter. And because ozone has such a short half-life it does not build up on surfaces the way detergents can if they are not removed by proper rinsing. Ozone air is even used to blow dry food products to eliminate cross-contamination in the air, and ozone refrigeration is used to eliminate mold build-up.

Another important consideration is the preservation of fresh produce. Studies of fruits and vegetables indicate that cooling fruits and vegetables as soon as possible after harvest is a critical factor to extending product shelf life. So by adding ozone to the chilled air and water applied to fruits or vegetables after harvest, both decontamination and cooling can occur in one step.

Fortunately, ozone does not appear to injure vegetable and fruit tissues during contact with them. Several fresh-cut processors now equipped with ozone currently have preliminary results indicating that bacterial counts are lower as compared to chlorinated systems. Produce such as shredded lettuce exhibits a longer shelf life with less browning when washed with ozone than when chlorine is used, and has a noticeably better flavor.

Ozone is also ideal for cleaning and sanitizing beef, pork, poultry, seafood and other fish directly, as well as all the equipment and surfaces where they are packaged or processed. Vacuum packaging, using ozone gas is then used to ensure decontamination into the package.

Some additional benefits of ozone in the food preparation industry are that it:

- Extends the shelf life of food products
- Is much safer for employees than any conventional chemicals
- Eliminates all chemical usage and is chemical-free, without the chemical by-products of chlorination
- Eliminates the use of hot water and conventional sanitizer
- Is generated on site, thus eliminating the transporting, storing and handling of otherwise hazardous materials
- Is very inexpensive to produce once a generator is in use
- Permits recycling of wastewater

Comparing Ozone to Chlorine

Safety

Chlorine has traditionally been the sanitizer of choice in the food processing industry, but experts share a growing concern about the widespread use of chlorine. According to a 2004 article in the *Journal of Environmental Science and Health*, when chlorine reacts with naturally occurring substances such as decomposing plant and animal materials in water it produces known carcinogenic compounds called trihalomethanes and haloacetic acids. These by-products of chlorination are formed in drinking water and therefore have been constantly monitored in water treatment facilities supplying our nation's water. Because certain cancers are now clearly correlated with chlorinated drinking water consumption, the U.S. President's Council on Environmental Quality stated, "there is increased evidence for an association between rectal, colon and bladder cancer and the consumption of chlorinated drinking water." Bladder cancer is the most prominent cancer because harmful water-soluble molecules always end up in the bladder before being eliminated. Yet proving chlorination causes cancer has been difficult because of the many confounding factors. These factors include other known cancer promoters found in paints and solvents, inks, some metals, polycyclic aromatic hydrocarbons, combustion products, and diesel exhaust fumes.

Ozone has its own potential safety drawback that deserves mentioning. If ozone at very high concentrations and very long contact times is used in water that has a broad range of organic compounds, it can produce a variety of by-products. The by-products that are of concern and that are constantly being monitored are the formation of aldehyde, bromate, and other organo-bromine compounds. Fortunately, water treated with ozone can be filtered, settled or given a light chlorination following ozone treatment.

Cost

Many cost comparisons between ozone and chlorine have been conducted for a variety of applications. An exhaustive comparative analysis between these two methods is beyond the scope of this paper. Worth mentioning is that depending on the particular use and application, chlorine is generally less expensive. But as newer applications are being discovered and a greater need for safety and quality, ozone becomes less expensive overall with superior results. For example, one must consider the inherent costs of chlorine's transport, cleanup and storage of potentially hazardous toxic chemicals. In contrast, ozone is generated onsite without storage requirements and is made from harmless oxygen. Depending on the application, chlorination may be less or more expensive than ozone treatment.

Efficacy

Ozone is highly reactive molecule, killing bacteria and other microbes 3,000 times faster than chlorine. Because it is so highly reactive, ozone is also effective at removing organic contaminates that grow on food processing equipment.

Pesticides, herbicides, fungicides and industrial chemicals

A developing national issue with our foods is the widespread use of pesticides, herbicides and fungicides on our crops. The use of these chemicals has unquestionably enhanced farmer's crop yields. These chemicals have also assisted your grocery store to carry fresher produce—another benefit few would want to lose. Yet with these benefits comes a peaking national concern about the harmful effects of these chemicals. This has led to the now huge organic food movement, aimed at making our produce safer for health.

Paralleling this organic foods movement is the concern over the known dangerous chlorine waste by-products we call Priority Hazardous Substances. These chemicals that also are showing up in our water and food supplies in alarming amounts are better known as dioxins, polychlorinated biphenyls (PCBs) and a host of similarly hazardous industrial by-products. These carcinogenic substances are currently regulated in drinking water by the EPA.

But if you are health conscious you likely know the dangers of chronic consumption of foods tainted with these harmful chemical compounds. The good news is that ozone is proving to be a viable answer to this growing concern. In addition to flushing away infectious microbes from your raw meats, dairy and fresh produce, ozone can oxidize and eliminate many chemical residues from your food.

Ozone is being reported in scientific literature to oxidize a number of pesticides, herbicides, fungicides, and other Priority Hazardous Substances. This can often be done by ozone alone. However, even better results occur when ozone in combined with ultraviolet light, hydrogen peroxide, or titanium dioxide. This is an effect that is certainly not found with chlorination.

One example of a more stubborn and dangerous herbicide that ozone has a useful effect against is atrazine. Atrazine is widely used, as indicated by its 29 trade names or synonyms. It was estimated to be the most heavily used herbicide in the United States prior to 1993, although its effects persist in our drinking water nationwide. Its long term exposure at levels above the EPA's maximum containment goals in water is known to cause the following adverse health effects: heart damage, retinal degeneration, muscle degeneration, and cancer.

Researchers in Spain found that ozone was the most effective against atrazine when ultraviolet radiation was added, while within a year of this, in the December 2000 publication in the *Journal of Hazardous Materials*, German scientists reported their study in *Water Science Technology* that by combining ozone with UV light or hydrogen peroxide they were able to get a 90% degradation of atrazine.

It is also found that ozone alone is a promising method of efficiently removing pharmaceutical drugs that are known to persistent in drinking water. Swiss researchers used ozone on five prescription medications known to persist in water and found these drugs to be completely transformed two to three times faster than atrazine is transformed.

Side Bar

Herbicides: from the farmer's fields to your body's tissues

The current industry standard is not enough. Chlorination, for example, is not necessarily the food sanitizer of choice anymore when there are superior methods. The food industry will settle for government standards because they can. But they're not telling you about food surface residues of pesticides, herbicides and chemical detergents that remain even after current food cleaning methods.

But do these chemicals actually affect us, or is this just a hypothesis? Theo Colborn, Ph.D., who is highly published in peer-reviewed scientific literature, found that the herbicide 2,4 D (the most widespread herbicide) was detected in 50 percent of semen samples from a group of Canadian men ages 20-59 and that the pesticide CPF was detected in 82 percent of urine samples tested.

But Dr Colborn's research doesn't just stop there. His work demonstrates that over 60 percent of the poundage of all agricultural herbicides and up to 90 percent of a pesticide product is capable of disrupting animal (and therefore human) endocrine and/or reproductive systems. This matches what is occurring with astonishing prevalence in America—a clinical picture of cell membrane receptor-site disruption and resistance to the active hormone as is found in hypothyroidism and type II diabetes. Additionally, these toxic chemicals are fat soluble compounds, which we know store nicely in human fatty tissues of the skin and deeper organs such as the brain, 60 percent of which is composed of fat.

Summary

The simple but powerful molecule ozone is naturally used by the earth to clean the atmosphere. Thankfully, it can now be safely and efficiently generated for many food-grade cleaning purposes. Ozone is becoming the preferred method for disinfecting water supplies for many reasons, primarily effectiveness and health safety. Ozone has now been recommended by the U.S. Food and Drug Administration for sanitizing food supplies of all types. Ozone is even being shown to evaporate pesticide, herbicide and other persistent chemical residues from produce surfaces resulting in a new generation of healthier and safer foods.