

# FOODBORNE ILLNESS

Teacher's  
Guide



## Introduction

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This Teacher's Guide provides information to help you get the most out of *Food-Borne Illness*. The contents in this guide will allow you to prepare your students before using the program and present follow-up activities to reinforce the program's key learning points.

With the invisible enemy of bacteria and visible threats like grease fires, the kitchen can be a breeding ground for danger. From painful cuts to cramping guts, poorly maintained equipment and carelessly stored foods can lead to serious health risks. The three-part *Kitchen and Food Safety* series addresses the what's, why's and how's of the hidden health hazards we face with every bite, and the simple steps we can take to preserve our foods—and our well-being.

## Learning Objectives

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After viewing the program, students will be able to:

- Recognize the causes and symptoms of food-borne illnesses.
- Prevent the onset of food-borne illnesses.
- Cook food to proper temperatures.
- Determine the relationship between germs and food-borne illness.
- Discuss the bacteria danger zone, and the importance of handwashing and personal cleanliness.
- Identify the most common food-borne pathogens (*E. coli*, *botulinum*, *Salmonella*, *Staphylococcus*, etc.), where they are found, and who is most at risk to develop food-borne infections.
- Decide when it's time to discard leftovers in the refrigerator.

## Educational Standards

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### National Standards

This program correlates with the National Standards for Family and Consumer Sciences Education, the National Health Education Standards, and the National Science Education Standards. The content has been aligned with the following educational standards and benchmarks from these organizations.

### National Standards for Family and Consumer Sciences Education

- Demonstrate food safety and sanitation procedures.
- Apply risk management procedures to food safety, food testing, and sanitation.
- Demonstrate ability to acquire, handle, and use foods to meet nutrition and wellness needs of individuals and families across the life span.
- Evaluate factors that affect food safety, from production through consumption.

### National Health Education Standards

- Students will comprehend concepts related to health promotion and disease prevention.
- Students will demonstrate the ability to access valid health information and health-promoting products and services.
- Students will demonstrate the ability to practice health-enhancing behaviors and reduce health risks.

### **National Science Education Standards**

- Science in Personal and Social Perspectives: As a result of activities in grades 9-12, all students should develop understanding of personal and community health, population growth, natural resources, environmental quality, natural and human-induced hazards, and science and technology in local, national, and global challenges.

*Reprinted with permission from National Science Education Standards ©1999 by the National Academy of Sciences, courtesy of the National Academies Press, Washington, D.C.*

### **English Language Arts from National Council of Teachers of English**

The activities in this Teacher's Guide were created in compliance with the National Standards for the English Language Arts from the National Council of Teachers of English.

- Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information).
- Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes.
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes.
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge.
- Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate, and synthesize data from a variety of sources (e.g., print and non-print texts, artifacts, people) to communicate their discoveries.

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### **Technology—National Educational Technology Standards from ISTE**

The activities in this Teacher's Guide were created in compliance with the following National Education Technology Standards from the National Education Technology Standards Project, the International Society for Technology in Education.

- Students are proficient in the use of technology.
- Students demonstrate a sound understanding of the nature and operation of technology systems.
- Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences.
- Students use productivity tools to collaborate in constructing technology-enhanced models, prepare publications, and produce other creative works.
- Students use technology to locate, evaluate, and collect information from a variety of sources.
- Students use technology tools to enhance learning, increase productivity, and promote creativity.

*"The National Education Technology Standards" reprinted with permission from the International Society of Technology Education.*

### **Curriculum Areas**

- Relevant curriculum areas include Health and Home Economics.

## Program Overview

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This program, *Food-Borne Illness*, takes an in-depth look at the practices that anyone who handles food should follow to prevent the spread of bacteria, and to assure that the foods we eat are safe and enjoyable. Viewers investigate the cause, symptoms, and treatment of food-borne illnesses with emphasis placed on their prevention. Viewers learn how to recognize the symptoms associated with food-borne illnesses such as *Salmonella* and *E. coli* bacteria. They also acquire key information about these illnesses—why they make people sick, how long an illness should be expected to last, safe and proper treatments of each illness, and when to pay a visit to the doctor's office.

## Main Topics

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### Topic 1: Bacteria and Viruses

The most common food-borne illnesses can be caused by either bacteria or viruses, including *Salmonella*, *Campylobacter jejuni*, and *botulinum*. Symptoms range from gastrointestinal distress to blurred vision, and can sometimes result in death.

### Topic 2: Prevention of Food-borne Illnesses

Proper selection, preparation, cleaning, storage, thawing, and labeling can go a long way toward preventing food-borne illnesses.

### Topic 3: Catching the Culprit

Consumers can play a role in advocating for food safety by reporting illnesses, concerns, or potential violations to the appropriate agencies.

## Fast Facts

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- More than 250 different diseases can be linked to contaminated food or drinks.
- 85% of reported cases of food poisoning could have been prevented with proper food selection and storage.
- Chemical, physical, and biological contaminants often find their way into food.
- The most common pathogens which cause food-borne illnesses are *Campylobacter*, *Salmonella*, *E. coli*, and *Calicivirus*.
- The US imports over 40% of its fresh foods from Mexico, Chile, Guatemala, Costa Rica, Canada, and other countries. Seasonality, climate, and low cost necessitate these imports.
- In the US, the United States Department of Agriculture (USDA) is in charge of controlling all meat, poultry, and all foods containing frozen eggs; the Food and Drug Administration (FDA) is in charge of all other foods.
- The Centers for Disease Control and Prevention (CDC) estimates that about 70% of all food-borne illness outbreaks occur in foodservice operations, compared to 20% traceable to homes.
- In the United States, around 7 million people will suffer from food-borne illnesses this year.
- About 40,000 cases of *Salmonella* poisoning are reported to the CDC each year, but the agency estimates that 100 times that many cases go undiagnosed and unreported.
- Almost 25% of our raw chicken is contaminated with *Salmonella*.
- Infants are particularly susceptible to botulism; they can get it by eating raw honey. Children under age one should never eat honey.
- Viruses are the smallest and simplest forms of life. Once inside a human being, they reproduce very quickly.

## Vocabulary Terms

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**antibiotics:** Medicines created using microbes or fungi that are weakened and taken into the body to destroy harmful bacteria.

**bacteria:** Tiny living things that live on food, plants, animals and soil. Under the right conditions, bacteria can double in number every 10 to 30 minutes.

**botulism:** A disease caused by a pathogen found in low-acid canned foods, meats, sausage, fish.

**Calicivirus:** Pathogen found in raw shellfish, water, ice, and salads, that can spread from one affected person to another. Often known as Norwalk virus.

**Campylobacter:** The most commonly identified bacterial cause of diarrhea in the world, it lives in the intestines of healthy birds. Found in raw milk, eggs, poultry, raw beef, and water.

**CDC:** The Centers for Disease Control and Prevention. The CDC is one of the 13 major operating components of the Department of Health and Human Services.

**Clostridium perfringens:** Pathogen found in meat, poultry, and other foods maintained at warm, but not hot, temperatures.

**contamination:** The presence of harmful substances in food.

**cross-contamination:** The transfer of harmful bacteria from one food or utensil to another.

**Cryptosporidium parvum:** Pathogen found in contaminated water or milk; can be transmitted person-to-person.

**danger zone:** The range of temperatures, between 41° F and 140° F, at which most bacteria multiply rapidly.

**E. coli:** Species of bacteria that lives in the intestines of people and other vertebrates. Naturally occurring *E. coli* are helpful in digestion, while ingesting some types of *E. coli* can cause severe food poisoning or even death. Found in ground beef, raw milk, alfalfa sprouts, unpasteurized fruit juices, lettuce, and game meat.

**HHS:** The Department of Health and Human Services. The HHS is the principal agency in the United States government for protecting the health and safety of all Americans and for providing essential human services.

**listeriosis:** A disease caused by a pathogen found in vegetables, milk, cheese, meat, and seafood.

**pathogens:** Bacteria that use the nutrients found in potentially hazardous foods to multiply.

**perishable:** Likely to spoil or expire if not handled properly.

**Salmonella:** Used to refer to several types of bacteria, many of which cause illness in humans and animals. Found in meat, poultry, egg, or milk products.

**Staphylococcus:** Pathogen found in custard or cream-filled baked goods, ham, poultry, eggs, potato salad, and cream sauces.

**Toxoplasma gondii:** A parasite that may cause no symptoms in healthy people, but can cause severe infection in unborn babies and in people with weakened immune systems. Found in cat, rodent, or bird feces, and in litter boxes.

**yersiniosis:** A disease caused by a pathogen found in raw milk, chocolate milk, water, pork, and other raw meats.

## Pre-Program Discussion Questions

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1. Good personal hygiene helps to keep you healthy. What everyday hygiene practices can help prevent food-borne illnesses?
2. When was the last time you ate leftovers at a meal? How were the leftover meals stored? How could they have been stored differently to decrease the chance of a food-borne illness?
3. Some people are more at risk for food-borne illnesses. Which populations do you think are most susceptible? Why?
4. What are some common symptoms of food sickness?
5. Think about the last time you ate at a restaurant. What steps did the restaurant staff take to ensure your health?

## Post-Program Discussion Questions

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1. What are some simple steps that food manufacturers and stores take to ensure that the food you buy is safe to eat?
2. How does the government protect consumers from food-borne illnesses?
3. What types of foods are most likely to introduce bacteria and food-borne pathogens into your diet? Why?
4. What health tip or safety advice from the video will be the most useful to you? How will you put it into practice?
5. What new technologies (manufacturing, packaging, storage, medical, information sharing) will improve our ability to prevent and respond to food-borne illnesses in the future?

## Group Activities

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### HACCP

Hazard Analysis Critical Control Point (HACCP) principles aim to prevent food-borne illness in the home. The principles include Purchasing, Storing, Preparing, Cooking, Serving, and Handling Leftovers. Divide students into groups and have each group develop a creative approach to teaching the HACCP principles to elementary school students. Examples might include a song, a mnemonic device, a word find, a skit, a comic strip, etc. Then have students share their project with groups of younger students.

### **Better, Faster, Stronger**

According to the CDC, “newly recognized microbes emerge as public health problems for several reasons: 1) microbes can easily spread around the world, 2) new microbes evolve, 3) the environment changes, 4) food production practices and consumption habits change, and 5) better laboratory tests can now identify microbes that were previously unrecognized.” Divide students into groups, and have each group report on one of the five factors affecting public health.

### **Invisible Guests**

Divide students into groups, and have each group prepare a menu for a party or festive meal. Then have students list the potential illnesses that might be occurring in each menu item, its symptoms, and keys to contamination prevention.

## **Individual Student Projects**

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### **What’s in the Suitcase?**

The US government has rules about the types of foods that can and cannot be brought into this country by travelers. Have students research the guidelines for the following categories: fruits and vegetables, prepared foods, meat, poultry and livestock, and plants and seeds. Through a short written paper, a poster, or a multimedia project, students should explain the potential risks and restrictions associated with each category.

### **C.S.I.: Contamination Scene Investigator**

Ask each student to imagine a potential food-borne illness outbreak, and to write down the scenario. Examples of locations where an outbreak might occur include supermarkets, picnics, parties, or restaurants. Then, students should create a list of investigatory steps, including questions to ask and people to interview, to help discover exactly which foods were contaminated.

### **Career Advice**

There are many exciting career opportunities that involve food safety. For example, careers in science, health, manufacturing, the medical industry, and selling, preparing, and serving food can all be connected to food safety. Challenge each student to think of as many specific careers as possible that include food safety responsibilities. For a starting point, encourage students to visit the following websites:

#### **USFDA Center for Food Safety and Applied Nutrition—Food Safety Careers**

[www.cfsan.fda.gov/~dms/careers.html](http://www.cfsan.fda.gov/~dms/careers.html)

#### **Culinary Arts and Food Science Career Guide**

[www.khake.com/page30.html](http://www.khake.com/page30.html)

Once they have created their list, ask them to identify which jobs would be of interest to them, and then encourage them to learn more about each.

## Internet Activities

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### Puny but Powerful

Have students research and report on one or more of the following food-borne pathogens:

- *Botulinum*
- *Calicivirus*
- *Campylobacter*
- *Clostridium perfringens*
- *Cryptosporidium parvum*
- *E. coli*
- *Listeria*
- *Salmonella*
- *Staphylococcus*
- *Toxoplasma gondii*
- *Yersinia*

Students should then create a poster or bulletin board to exhibit their findings.

### Lingering Concerns

According to the CDC, there are many unsolved problems in food-borne disease. Ask students to brainstorm how they might go about finding out useful information towards answering some of these open issues:

- How do food-borne pathogens spread among animals, and how can this be prevented?
- What is the cause of outbreaks in which no pathogen can be identified by current methods? Are these outbreaks caused by pathogens we simply do not yet know how to identify?
- How would educating restaurant workers in basic food safety affect the risk of food-borne disease among restaurant patrons?
- How can the food and water that animals consume be made safer?
- How can we dispose of animal manure usefully, without threatening the food supply and the environment?
- How can basic food safety principles be most effectively taught to schoolchildren?
- How can we be sure food safety standards in other countries are as good as those in the United States?
- How can irradiation pasteurization of certain high-risk foods, such as ground beef, be used most effectively?
- How do raspberries in Central America get contaminated with *Cyclospora*?
- Sprouts are unique among foods in that the conditions for sprouting are also perfect for bacterial growth—and, sprouts are not cooked before being eaten. How can this food be produced safely?



## Meta-Internet Project

Ask students to investigate effective ways of using technology to let other students know about the danger of food-borne illnesses. Examples might include Internet blogs, “viral” emails, and informational websites. Challenge students to take one idea and develop it into an actual campaign to get the message out to others in their class and around the globe.

## Assessment Questions

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**Q1:** How many different diseases can be linked to contaminated foods or drinks?

**A:** More than 250.

**Feedback:** Most of these diseases are infections caused by a variety of bacteria, viruses, and parasites, while other diseases are caused by harmful toxins or chemicals.

**Q2:** In what kind of environments do bacteria thrive?

- a) Cool and dry
- b) Cool and moist
- c) Warm and moist
- d) Warm and dry

**A:** c) Warm and moist

**Feedback:** While there are some exceptions, most bacteria thrive in warm, moist, protein-rich and/or low-acid places, which is why these foods need to be refrigerated.

**Q3:** Who is at highest risk for food-borne illness?

**A:** The elderly, infants, fetuses, children, pregnant women, and those with weakened immune systems.

**Feedback:** Anyone who may not have strong enough body systems to ward off food-borne illness is at high risk.

**Q4:** Where is *Salmonella* not frequently found?

- a) Raw meat
- b) Raw eggs
- c) Raw chicken
- d) Raw vegetables

**A:** d) Raw vegetables

**Feedback:** While raw vegetables, like any food, might become cross-contaminated with bacteria, *Salmonella* is most often found in uncooked poultry, eggs, and meat.

**Q5:** Approximately how many cases of *Salmonella* poisoning are reported each year to the CDC?

**A:** 40,000

**Feedback:** Most cases go unreported because victims mistake their symptoms for the flu. It is estimated that approximately 600 persons die each year with acute salmonellosis.

**Q6:** In rare cases, *Campylobacter* infection leads to what illness?

- a) Salmonellosis
- b) Botulism
- c) Lupus
- d) Guillain-Barré

**A:** d) Guillain-Barré

**Feedback:** Guillain-Barré syndrome is a serious, paralyzing neurological illness.

**Q7:** True or False: Grinding meat spreads bacteria.

**A:** True

**Feedback:** Bacteria spreads throughout the meat as it is processed. Whole cuts of meat likely have the bacteria only on the surface.

**Q8:** Which two food-borne illnesses are rare, but deadly?

- a) Botulism and mononucleosis
- b) Botulism and *Cryptosporidium parvum*
- c) Listeriosis and *Cryptosporidium parvum*
- d) Listeriosis and botulism

**A:** d) Listeriosis and botulism

**Feedback:** Botulism can lead to complete paralysis, respiratory failure, and death, while listeriosis can lead to meningitis, spontaneous miscarriage, stillbirth, and death.

**Q9:** What is the best way to determine if meat is fully cooked?

- a) Seeing if juices run clear
- b) Using a meat thermometer
- c) Using an oven thermometer
- d) Checking for brownness

**A:** b) Using a meat thermometer

**Feedback:** A meat thermometer is the most foolproof way to determine whether meat has reached the internal temperature needed to kill harmful bacteria.

**Q10:** What is the proper temperature for a freezer?

- a) 40° F
- b) 32° F
- c) 0° F
- d) -32° F

**A:** c) 0° F

**Feedback:** While many foods might be safe at a slightly warmer temperature, much of the quality and storage time of the food is affected.

**Q11:** True or False: Canned goods are not affected by storage temperature.

**A:** False

**Feedback:** Canned goods should be kept in a dry, cool spot to maximize shelf life and quality.

**Q12:** Which is not a safe way to thaw frozen foods:

- a) in cold water
- b) in warm water
- c) in the microwave
- d) in the refrigerator

**A:** b) in warm water

**Feedback:** Bacteria thrive in warm, moist places, so warm water and countertops are to be avoided for safe thawing.

**Q13:** True or False: Rare meats are safe to eat if they come from a reliable butcher.

**A:** False

**Feedback:** Rare meats whose core temperature is less than 145° F run the risk of food-borne illness, regardless of how reliable their source.

## WEB RESOURCES

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### Home Food Safety

<http://www.homefoodsafety.org/index.jsp>

### Food Safety First

<http://www.foodsafetyfirst.org>

### The Food Network

<http://www.foodnetwork.com>

### Food Safety

<http://foodsafety.cas.psu.edu>

### Gateway to Government Food Safety Information

<http://www.foodsafety.gov/~fsg/vlibrary.html>

### FDA Foodborne Illness Education Information Center

<http://www.nal.usda.gov/food-borne>

### Centers for Disease Control and Prevention

<http://www.cdc.gov/ncidod/op/index.htm>

### National Ag Safety Database

<http://www.cdc.gov/nasd>

## Additional Resources at [www.filmsmediagroup.com](http://www.filmsmediagroup.com)

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*Available from Films Media Group • [www.filmsmediagroup.com](http://www.filmsmediagroup.com) • 1-800-257-5126*

### Early Childhood: Food Safety

- VHS
- Includes supplement with quizzes and answer keys
- Item # 32576

This video delivers key information on serving safe food to infants, toddlers, and preschoolers, covering common bacteria, food-borne illnesses, symptoms of food poisoning, sanitizing and disinfecting, and how to be a safe shopper. Make your food safety motto "When in doubt, toss it out!" A supplement, containing the video's goal and objectives as well as multiple-choice quizzes and answer keys, is included. Filmed in collaboration with Dr. LuAnn Soliah, a registered dietician and director of nutrition sciences at Baylor University. © 2000. (31 minutes)

## **Food Safety and Sanitation**

- VHS
- Includes supplement with quizzes and answer keys
- Item # 32584

Food safety and sanitation go together like a hand in a glove. That's why your students need to see this video. It addresses personal hygiene, kitchen and equipment cleanliness and sanitation, and proper cooking temperatures while offering tips on how to avoid food-related illness and injury, both at home and when dining out. Interactive scenes identify common food safety problems and encourage classroom discussion. An information-packed supplement, complete with quizzes and answer keys, is included. © 2000. (32 minutes)

## **Food Safety: From Market to Plate**

- VHS/DVD-R
- Closed captioned
- Viewable/printable teacher's guide online
- Item # 32554

What's the best way to avoid salmonella, E. coli, and other dangerous food-borne bugs? Information! Use this fact-filled video to show your students how to buy, store, and prepare delicious food with their health—and the health of anyone who eats with them—firmly in mind. At the supermarket, in the kitchen, and at the dinner table, knowledge is the key to safety. A Meridian Production. © 2000. (17 minutes)

## **Food Safety: What You Don't Know Can Hurt You**

- VHS/DVD-R/Digital On Demand
- Also available on CD-ROM (Windows only; Item # 11102)
- Correlates to educational standards
- Item # 11103

Can defrosted leftovers be refrozen? What is trichinosis? And if a pan catches fire, what is the best way to put it out? This concise program explains the importance of proper food handling, storage, and cooking in order to prevent spoilage, waste, and potential food poisoning. Good kitchen safety habits are detailed as well, which can help in avoiding common accidents. A Meridian Production. © 1996. (12 minutes)

## **Kitchen Safety Posters**

- Ten 17"x22" laminated posters
- Correlates to National Standards for Family and Consumer Sciences Education
- Item # 27612

This handsomely designed poster series uses attention-grabbing phrases, informative text, and beautiful illustrations and photographs to teach important aspects of kitchen safety. Perfect for reminding and teaching students how to play it safe, whether they are preparing for a career in an industrial kitchen or learning to manage a home kitchen. Poster topics: "Away" to Keep Safe; Kitchen Fires (Smoke Detectors); Unplug to Scrub; Microwave Safety; Cut and Burn Treatment; Stove & Range Safety; Work Area; Extinguishers; Bubble, Bubble; Food Safety. A Cambridge Educational Product. © 1996.

## **Safety in the Kitchen**

- VHS/DVD-R
- Item # 26240

Safety and sanitation in the kitchen are areas of vital importance and must be strictly maintained in order to save yourself and your family from dangerous accidents and potentially fatal illnesses. This thorough program covers all the basics of keeping a safe and sanitary kitchen, and is divided into the following topics: burns and scalds; cuts and wounds; slips and falls; kitchen sanitation; and caustic poisons. The section on kitchen sanitation gives special attention to food-borne illnesses and their prevention. Vital information for anyone working in or around a kitchen is presented in a straightforward way, using a visually interesting approach. A Meridian Production. © 1996. (23 minutes)

## **Irradiation—Promise or Threat?**

- VHS/DVD-R/Digital On Demand
- Preview clip online
- Closed captioned
- Correlates to the Health National Standards from the Joint Committee for National School Health Education and the American Cancer Society and the National Content Standards for Health according to the American School Health Association
- Item # 32141

The U.S. government has given its stamp of approval to irradiation as a way of killing food-borne bacteria, germs, and parasites. If irradiated food is considered safe enough to give to immune-compromised patients in hospitals and astronauts in space, why is the practice of food irradiation so controversial? This program offers a balanced look at this important method of food purification as it explains how X-rays, electron beams, and gamma radiation are used to sterilize food; identifies watchdog groups—the World Health Organization, the Centers for Disease Control and Prevention, the American Medical Association, and others—that keep an eye on the effectiveness and safety of irradiation technology; and presents the concerns of opponents. Which side of the debate are your students on? This video will definitely help them decide. A Cambridge Educational Production. © 2004. (19 minutes)

For information on other programs visit our website at

**[www.meridianeducation.com](http://www.meridianeducation.com)**

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