Besides reviewing OTC drugs, the FDA looks at many prescription drugs to assess their safety and effectiveness. In several instances, the FDA has ruled that a prescription drug can be marketed as an OTC drug because it is relatively safe and effective. These prescription drugs have been reformulated to be less potent. Hence, the difference between many OTC and prescription drugs is the amount of active ingredient.

Another difference between prescribed and OTC drugs is that many chemicals in prescription drugs are not available for use in OTC drugs. Prescription drugs that have been switched to OTC drugs include ibuprofen (an analgesic drug sold as Nuprin, Advil, and Motrin), Dramamine (used for motion sickness), Actifed (a decongestant), Dimetapp (a cold medicine), and orlistat (alli). With the pressing need to lower health care costs, the FDA is considering making many more prescription drugs available over the counter.[16]

Herbal Drugs

A largely unregulated segment of the marketplace is that of herbal drugs. Part of the problem with regulating these products is that it is unclear whether they should be classified as drugs, foods, or herbs. Herbal drugs are often marketed as food supplements. The FDA does not oversee food supplements; consequently, there is no regulation of these products. However, manufacturers of herbal drugs cannot make claims regarding their purported benefits without proof. If there are numerous complaints regarding an herbal drug, it can be removed from the market.

The use of herbal drugs in China, India, Rome, Greece, Egypt, and Syria dates back to 500 years ago, and today, global sales of herbal drugs are estimated at $60 billion annually.[17] Up to 20% of Americans and 41% of British people have used herbal drugs.[18] While herbal drugs have evolved from fringe drugs to mainstream drugs, research into the safety and effectiveness of these drugs remains lacking.[19] In 2011, the European Union banned hundreds of herbal remedies although other herbal remedies can be sold if they are licensed. Licenses are given if the products meet safety, quality, and manufacturing standards and provide information on possible side effects.[20]

Some herbal remedies can interfere with the effectiveness of conventional drugs. For example, St John's wort, used for depression, may reduce the effectiveness of the birth control pill, while ginseng is not suitable for diabetics, and garlic may interfere with HIV medication.[21] There is also concern that herbal drugs will be used for euphoric or hallucinogenic purposes.[22] Table 14.1 lists selected herbal drugs and their intended uses.

CATEGORIES OF OTC DRUGS

Category I:	Generally recognized as safe (GRAS), generally recognized as effective (GRAE), and generally recognized as honestly labeled (GRAHL)
Category II:	Not generally recognized as safe or effective, or not properly labeled; removed from the shelves within six months
Category III:	Insufficient research regarding a drug's safety and effectiveness; cannot be sold

Analgesics

The vast majority of Americans reported using an OTC pain reliever within the past year. Advertisements constantly remind us that pain relievers are indispensable. We are told that we do not have to live with minor aches and pains that affect our daily lives. The message is clear: Pain and discomfort are nuisances that we do not have to tolerate. Despite their benefits, all analgesic drugs have adverse side effects.[23]

The two basic types of **analgesics** are internal and external:

- *External analgesics*, such as Ben-Gay and Absorbine, are applied to the skin for sore muscles. Their benefit is more psychological than physical.
- *Internal analgesics* are taken into the body. Most analgesics are internal. Aspirin is the drug used most commonly. Americans ingest more than 10,000 *tons* of aspirin each year, which equates to 80 million aspirin or aspirin-containing tablets consumed every day.

At one time, aspirin dominated the analgesic market. Now, competitive analgesic products include acetaminophen, ibuprofen, naproxen sodium, and ketoprofen. These products effectively alleviate moderate pain, though they differ in other respects. Like aspirin, they have adverse side effects. In 2009, almost 53,000 people went to emergency rooms due to acetaminophen, and over 27,000 people went to emergency rooms due to ibuprofen.[24]

Aspirin

Aspirin is the least expensive pain reliever. **Acetylsalicylic acid**, the active agent in aspirin, is similar to a chemical found in the bark of willow trees. Using willow bark for pain and fever was common among the ancient Greeks and American Indians. At one time, people in pain were given salicylic acid,

TABLE 14.1 Commonly Used Herbal Supplements

Herb	Common Uses	Cautions
Chamomile	Used for GI complaints	Can cause toxicity of calcium channel blockers and antihyperlipidemics Has an additive effect when taken with alcohol or sedatives
Ginkgo	Used to improve circulation impaired by vascular disease Used to improve cognition and memory	Can increase bleeding in individuals already taking aspirin or warfarin
Melatonin	May help reestablish proper circadian rhythm	Should be taken in the early evening Can cause some stomach upset
St. John's wort	Used as an antidepressant Used as an antiviral	Can cause photosensitivity
Echinacea	Enhances the immune system Can be used as a sun protectant	Immunosuppression can occur with usage of more than eight weeks (immunocompromised individuals should not use)
Ginseng	Used for energy	Contraindicated in individuals with blood-clotting disorders Will increase blood pressure Can reduce the effectiveness of antihypertensive agents
Glucosamine	Stimulates the biosynthesis of a cartilage-building compound May also reduce inflammation	May exacerbate diabetes
Goldenseal	Used for High blood pressure Poor appetite Infections Menstrual problems Minor sciatic pain Muscle spasms Eye wash	Contraindicated in heart patients Should not be used with ear infections
Valarian	Used for its sedative action	Should not be used in children Should not be used in individuals with altered hepatic (liver) function
Kava	Used for anxiety, psychosis, and depression	Interacts with Levodopa, sedatives, central nervous system depressants, and barbiturates
Ginger	Used for motion sickness/stomach disorders	Multiple known drug interactions Can increase bleeding in individuals already taking aspirin or warfarin

but it resulted in stomach upset and nausea. By 1897, chemist Felix Hoffman of Bayer Laboratories had developed a compound combining salicylic acid and acetyl acid. This new compound, called aspirin, caused less stomach distress than salicylic acid. Aspirin works best for dull, constant pain but is ineffective for sharp pain. Aspirin is nonaddicting, it does not alter consciousness, and the senses of the user remain intact.

When a cell in the human body is injured, hormone-like chemicals called **prostaglandins** are activated. High levels of prostaglandins can cause headaches, inflammation, fever, blood clots, and menstrual cramps. These chemicals can also affect the reproductive, circulatory, and digestive systems. Aspirin inhibits the synthesis and release of prostaglandins, thereby reducing moderate pain by affecting the body's pain receptors and ameliorating inflammation and fever.

Because aspirin reduces inflammation, it is especially helpful in relieving symptoms of rheumatoid arthritis. About one in five adults in the United States have been diagnosed as having rheumatoid arthritis, including 50% of individuals aged 65 and older.[25]

analgesics Drugs that relieve pain

acetylsalicylic acid The agent in aspirin that relieves pain

prostaglandins Chemicals in the body that produce pain and inflammation; aspirin alters their synthesis

Aspirin acts as an **antipyretic**, or fever-reducing drug. It works on the hypothalamus, which dilates peripheral blood vessels. This increases respiration and blood flow, and the body cools down as a result. Antipyretic action is not always advantageous. Although a fever causes discomfort, it can be helpful because an elevation in body temperature destroys many bacteria and viruses. Thus, the fever-reducing effect of aspirin can be counterproductive. If the body temperature is normal, aspirin does not lower it.

Among the significant benefits attributed to aspirin is prevention of heart attacks and strokes. Low doses of aspirin (81 mg) have been shown to reduce the risk of clot-caused heart attacks.[26] It has been reported that people over age 45 who take low-dose aspirin reduce their risk of a heart attack by 25%.[27] Similarly, a study of nearly 80,000 nurses between the ages of 30 and 55 found that taking one to six aspirins weekly reduced the risk of a first heart attack in women.[28]

There are additional benefits to regular aspirin use. It has been shown that 100 mg of aspirin every other day reduced the risk of adult-onset asthma.[29] Among diabetics, aspirin use reduces the risk of retinopathy, the leading cause of blindness among people aged 20 to 65.[30] Another benefit of aspirin and other analgesic drugs is a reduction in cataracts. However, there is a relationship between regular aspirin use and aging macular disorder, a vision disorder.[31] A study of 662,000 U.S. men and women by the American Cancer Society concluded that "regular aspirin use at low doses may reduce the risk of fatal colon cancer." Other research found that long-term aspirin use reduced the likelihood of colorectal cancer.[32] Also, it has been found that aspirin may reduce the risk of breast cancer[33] as well as skin cancer.[34] A British study noted that the administration of low doses of aspirin for five or more years resulted in a 34% decline in deaths from all types of cancers.[35]

One study indicated that women who took aspirin daily for five years had better memory skills than women who did not take aspirin.[36] However, many elderly people who take aspirin also drink alcohol—and this combination is particularly harmful because it may result in internal hemorrhaging and prolonged bleeding.[37] The risk of internal bleeding increases when aspirin is used with other anticoagulant drugs such as warfarin.[38] Even at low dosage levels, aspirin can result in kidney damage for many elderly people.[39]

People who are allergic to aspirin develop rashes, weakness, stomach pain, breathing problems, wheezing, and asthma-like attacks that can be fatal. In other people, aspirin causes nausea, vomiting, blood loss, and iron-deficiency anemia. With as few as two to three aspirins, a person can bleed twice as long as normal. Patients having surgery and women in the late stages of pregnancy are advised not to take aspirin. Taking aspirin during pregnancy has been linked to postpartum hemorrhaging, prolonged labor, and higher perinatal mortality.

People with bleeding disorders, especially hemophilia and gastrointestinal problems, are cautioned not to use aspirin. Aspirin aggravates peptic ulcers, too.[40] To reduce stomach irritation, some people use buffered aspirin, though it does not diminish the irritation. The purpose of making an aspirin buffered is to increase sales. To minimize irritation, taking a full glass of water with aspirin helps.

Other problems related to extensive aspirin use include hepatitis, bone-marrow depression, and kidney damage. Most overdoses are seen in children. In children younger than age 5, aspirin is one of the leading causes of death by accidental poisoning. Symptoms of aspirin toxicity include perspiration, dizziness, hyperventilation, headache, thirst, ringing in the ears, and hearing loss. Unfortunately, 25% of Americans who use OTC pain drugs exceed the recommended dosage.[41]

Aspirin inhibits **interferon**, a natural substance in the body that helps ward off viruses. Hence, it results in people being more susceptible to viruses, including colds.

Children with chicken pox or flu-like symptoms should not be given aspirin because of the slight risk of developing Reye's syndrome. This serious condition is marked by severe personality changes, vomiting, disorientation, lethargy, and death in up to one-fourth of patients. Reye's syndrome does not occur with other analgesic drugs. In 1986, the British Committee on Safety of Medicine recommended that children under age 12 not be given aspirin without physician approval. Starting in 2003, the United Kingdom required that labels on aspirin packages state that aspirin should not be given to children younger than age 16.[42]

ON CAMPUS

A controversial topic is whether emergency contraception should be available as an OTC drug. One survey of college students found that 60% agreed that it should be available over the counter, 23% disagreed, and 17% were unsure.

Source: A Vahratian, D. A. Patel, K. Wolff, and X. Xiao, "College Students' Perceptions of Emergency Contraception Provision," *Journal of Women's Health* (January 2008).

ADVANTAGES AND DISADVANTAGES OF ASPIRIN

Advantages

- Eliminates dull pain
- Lessens inflammation
- Lowers fever
- May reduce colon, skin, and breast cancer
- May reduce risk of retinopathy and decrease cataracts
- Helps prevent heart attacks and strokes

Disadvantages

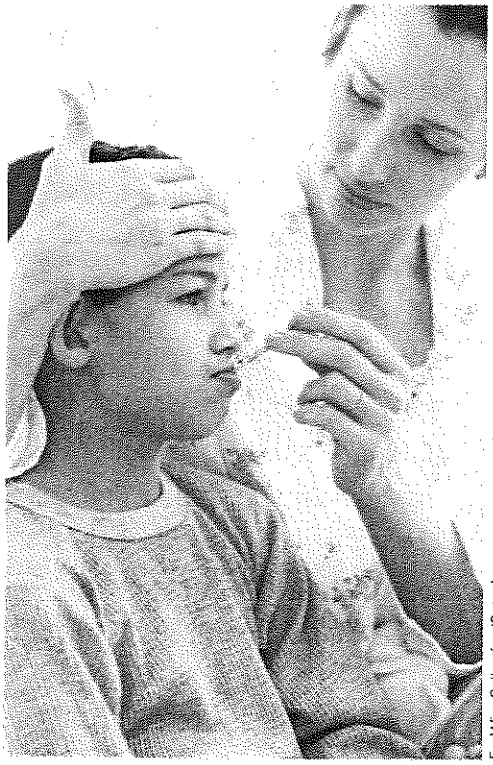
- Can cause allergic reaction
- Prolongs bleeding time
- Irritates the stomach
- Can cause kidney damage
- Can cause Reye's syndrome and possibly death

Acetaminophen

Because of concerns about the side effects of aspirin, many people have switched to other analgesics. One popular alternative is acetaminophen, a byproduct of **phenacetin**. Phenacetin was distributed widely in the 1940s and 1950s in combination with aspirin and caffeine. After a review, however, the FDA recommended that phenacetin use be limited to ten days. Eventually, it was banned altogether in the United States because it was linked to kidney problems as well as heart disease, hypertension, and cancer.

First marketed in 1955, acetaminophen reduces pain and fever. Since that time, its popularity has grown immensely. OTC products with acetaminophen include Tylenol, Datril, Anacin-3, and Panadol. Acetaminophen is believed to interfere with the synthesis of prostaglandins. It is not a safe alternative to aspirin, though. According to one research group, out of every 1,000 men who took acetaminophen for arthritis, 715 will improve, 4 will go to a hospital with a bleeding ulcer, and 12 will have a heart attack.[43] Other studies confirm that acetaminophen can produce adverse effects on the liver and kidneys.[44] To reduce the risk of liver damage, Johnson and Johnson, the manufacturer of Extra Strength Tylenol, recommends that the daily dose not exceed 3,000 mg.[45]

Signs of overdose, which might not appear for up to 48 hours, include stomach pain, fatigue, diarrhea, nausea, and vomiting. Children have died, usually from liver failure, after taking only a few Extra Strength Tylenol tablets. One study at the University of Texas Southwestern Medical Center found that acetaminophen was implicated in 38% of cases of acute liver failure. More cases of liver toxicity occurred



EyeWire Collection/Getty Images

Children with chicken pox or flu-like symptoms should not be given aspirin without a doctor's approval.

ADVANTAGES AND DISADVANTAGES OF ACETAMINOPHEN

Advantages

- Lessens pain
- Reduces fever
- Irritates stomach less than aspirin
- Does not prolong bleeding

Disadvantages

- Is ineffective for inflammation
- Can cause liver damage
- Can cause diarrhea, nausea, and vomiting
- May increase risk of hypertension
- Can cause death

antipyretic Having fever-reducing properties

interferon A natural substance in the body that wards off viral infections

phenacetin An alternative to aspirin now linked to kidney problems; its sale is prohibited

after people consumed two to three times the suggested dose within a 24- to 48-hour period.[46] Also, combining acetaminophen and alcohol is especially dangerous to the liver. In addition to these detrimental effects, one study of 51,529 male health professionals found that using acetaminophen four to five times a week increased the risk of hypertension.[47]

On the other hand, two advantages of acetaminophen over aspirin are that

1. it causes less stomach irritation and
2. it does not prolong bleeding time.

Thus, it is a better alternative for people who are allergic to aspirin or who are pregnant. Also, one study of 88,142 pregnant women found that acetaminophen was not associated with congenital abnormalities.[48]

Arthritis sufferers do not receive the same anti-inflammation benefit from acetaminophen as from aspirin. Another disadvantage is that the analgesic benefit of acetaminophen is delayed if it is taken with or shortly after eating high-carbohydrate foods. In a study of individuals with tension-type headaches and dental pain, acetaminophen, with codeine included, was less effective than aspirin.[49] It is difficult to avoid acetaminophen because it is found in at least 100 other medications.[50]

Ibuprofen

Another OTC drug that reduces moderate pain and inflammation is ibuprofen. It is a more potent pain reliever than aspirin and acetaminophen. One study found that people with back pain preferred ibuprofen to acetaminophen or aspirin.[51] Additionally, ibuprofen has been shown to be effective for relieving pain in pediatric patients.[52] When it was introduced, ibuprofen could be obtained only by prescription. In 1984, it was approved for OTC sale. Ibuprofen is less likely than aspirin to cause stomach upset, but it does prolong bleeding time. Doctors advise against using alcohol while taking ibuprofen because the combination increases the risk of stomach problems. Taking ibuprofen with food or milk helps to relieve upset stomach and mild heartburn. Analgesics with ibuprofen include Advil, Motrin-IB, and Nuprin.

Unlike acetaminophen, ibuprofen lessens inflammation. Thus, it is recommended for relieving symptoms of rheumatoid arthritis. People who are allergic to aspirin, however, might be allergic to ibuprofen also. As with aspirin and acetaminophen, individuals taking ibuprofen are cautioned against exceeding recommended dosages. Ibuprofen can impede concentration and cause drowsiness; therefore, it is not a good idea to operate equipment after taking ibuprofen.

Possible side effects from ibuprofen include vomiting, loss of hearing, nausea, elevated blood pressure, diarrhea, visual disturbances, heartburn, and congestive heart failure for people with impaired cardiac function. Its use has been linked to cataracts and death from liver failure. Ibuprofen has been implicated in the development of peptic ulcers[53] and enlarging the prostate.[54] Increased gastrointestinal bleeding has also been associated with ibuprofen use.[55] On a positive note, ibuprofen may reduce the risk of breast cancer in women.[56] Another positive finding is that ibuprofen, as well as aspirin, might reduce the risk of developing Alzheimer's disease.[57]

ADVANTAGES AND DISADVANTAGES OF IBUPROFEN

Advantages

- Reduces pain
- Lessens inflammation
- Produces less stomach upset
- May reduce risk of breast cancer and Alzheimer's disease

Disadvantages

- Prolongs bleeding time
- Can cause allergic reaction
- Has numerous side effects
- May increase risk of peptic ulcers and enlarged prostate
- Can cause death

ON CAMPUS

It is estimated that about 85% of American university students report backpack-related pain and discomfort. Discomfort was most common in the shoulders, lower back, upper-middle back, and neck. The findings may point to an emerging trend between pain and discomfort and time spent carrying backpacks. A loaded backpack should weigh no more than 10% to 15% of a student's body weight.

Source: Robert Preidt, The American Occupational Therapy Association Inc., News Release, September 3, 2008.

Naproxen Sodium and Ketoprofen

Two other entries into the OTC analgesic market are **naproxen sodium** and **ketoprofen**. Aleve is a popular brand of naproxen sodium, and Orudis KT and Actron are brands containing ketoprofen. Naproxen sodium is comparable to ibuprofen in effectiveness, and its analgesic effects last up to 12 hours. Ketoprofen is as effective as ibuprofen, and it produces results in about 30 minutes. Like aspirin, acetaminophen, and ibuprofen, naproxen sodium and ketoprofen reduce fever, and like aspirin and ibuprofen, they lessen inflammation.

One advantage of naproxen sodium is its long-term pain relief. One study reported that among people who took the drug for moderate and severe headaches, 52% experienced significant pain relief when the drug was first used and 90% experienced pain relief after three months.[58] In a separate study of 3,000 migraine sufferers, those who were given naproxen sodium were more likely to experience relief than those individuals given placebos.[59] The majority of people taking naproxen sodium do not encounter adverse side effects, although some patients experience gastrointestinal bleeding.[60] Naproxen sodium can sometimes cause bloating and dizziness.

Doctors advise consumers not to drink alcohol while taking these drugs. Both drugs work best for muscle pain, arthritis, and menstrual pain. For people not taking aspirin, naproxen may protect against heart attacks.[61] In 2003, a ketoprofen patch was approved for use as treatment for joint pain.[62] Ketoprofen has been shown to be more effective than acetaminophen for reducing fever in children.[63] Asthmatics and people who are allergic to aspirin should not take these drugs.

Cold and Allergy Drugs

OTC drugs sold to treat colds and allergies do not cure these conditions.[64] In 2011, the European Union banned hundreds of herbal remedies although others can be sold if they are licensed. This is achieved by the products meeting safety, quality and manufacturing standards and information identifying possible side effects. In 2010, the sales of cold and cough products totaled approximately $3.2 billion, which actually represented a 4.5% decline from the previous year. Children's cough and cold products went down 9.1%.[65]

What these drugs do is relieve symptoms of colds and allergies. This could be counterproductive in the long run, however. Colds are self-limiting conditions that go away notwithstanding treatment. Many people overcome colds (and other ailments) more quickly when physicians prescribe medications, even if the medications are **placebos**. A familiar adage says "A cold will end in a week with aspirin or in 7 days without anything."

The common cold has no cure. One problem with finding a cure is that a cold is far from "common" and actually is a complex condition. In addition, cough and cold remedies for children can be hazardous. One study involving 63 emergency rooms, dating from 2004 to 2005, found that 7,091 children under age 12 received treatment for adverse reactions to cough and cold medicines. The majority of children seen were between ages 2 and 5.[66] The FDA has recommended that cough and cold medicines be banned for infants.[67] In 2008, the regulating body in the United Kingdom issued a statement discouraging parents from providing children under age 6 with cough and cold medications. However, almost 90% of parents reported having given these medications to their children.[68] The following discussion examines the types of drugs that constitute the cold and allergy market.

Antihistamines

When allergens are present, the body releases chemicals called **histamines**. Histamines protect the body from diseases by releasing antibodies that attack antigens (foreign bodies), viruses, bacteria, and chemicals in the body. In doing so, they produce runny nose and eyes, sneezing, congestion, nausea, and itching. One study found that antihistamines were effective for relieving itching[69] and for nasal imflammation.[70] Second-generation antihistamines, which do not cause drowsiness, are more effective than older antihistamines.[71]

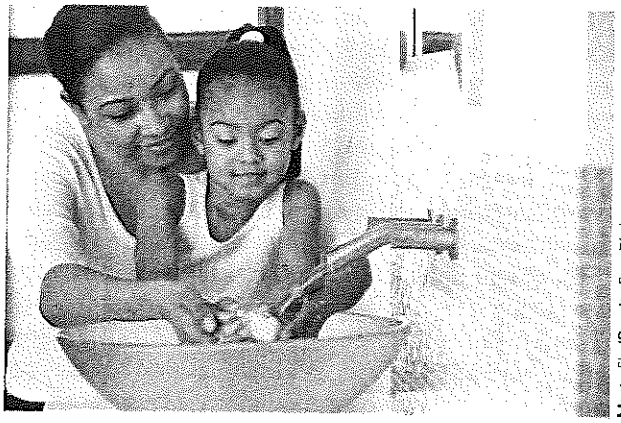
Besides treating allergies of the nose and eyes, second-generation antihistamines are effective for treating skin allergies.[72] They are also more effective than placebos for relieving headaches.[73] Antihistamines interfere with the release of histamines and thereby provide symptomatic relief from allergies. They do not cure colds. In fact, one study found that antihistamines may actually prolong ear infections in children.[74]

naproxen sodium An over-the-counter analgesic

ketoprofen An over-the-counter analgesic

placebos Inert substances that do not have a physical effect but may produce psychological and associated physiological reactions

histamines Chemicals that are released by the body in response to the presence of allergens



Masterfile (Royalty-Free Div.)

Washing the hands is one of the most effective means of preventing colds and other infectious diseases.

Antihistamines are found in cough syrups, hay fever and motion sickness preparations, and decongestants such as Contac, Dimetapp, Sudafed, and Triaminic. Antihistamines in Benadryl and similar allergy relievers make people drowsy and thereby affect driving ability. Antihistamine medications often contain alcohol, which contributes to drowsiness. Antihistamines also can produce dry mouth, nose, and throat; weakness; and constipation. An allergic reaction to antihistamines can cause blurred vision, dizziness, nervousness, headaches, hives, and an inability to urinate. Antihistamines have not been shown to increase the risk of breast cancer,[75] although some antihistamines may increase the risk of miscarriage.[76]

Cough Medicines

A cough can be productive—meaning that it produces secretions—or nonproductive. Nonproductive coughs irritate the throat. Drugs that suppress or prevent coughing are called **antitussives**. These cough suppressants act on the medulla, the brain's cough center. One study of children given antitussive cough medicines reported that 46% to 56% had satisfactory responses.[77]

Two antitussive drugs are codeine and dextromethorphan:

- **Codeine** provides relief within 15 to 30 minutes, and the effects last 4 to 6 hours after ingestion. One interesting study, however, found that chocolate was more effective than codeine in suppressing coughs.[78] Although codeine-based cough syrups do not require a prescription, their sale is regulated. Codeine causes dependency, but the risk is low compared with that for morphine. In 2007, the FDA issued a warning for nursing mothers who take codeine because there was a report of an infant who died after having been breastfed by its mother who took codeine. Cough medicines with codeine are associated with a higher frequency of adverse effects and toxicity in children.[79]
- **Dextromethorphan (Delsym)** is nonnarcotic and does not produce dependency, although it induces drowsiness, nausea, and dizziness. In recent years, dextromethorphan has become popular among young people as a mind-altering substance because it is easy to obtain, the negative effects are not widely known, and it is socially approved. The inappropriate use of dextromethorphan is also referred to as "robo-tripping."[80]
- Dextromethorphan, also known as DXM, can be lethal. In 2011, over 5% of 10th- and 12th-grade students reported having used cough medicine in the previous year to get high.[81] In 2010, an advisory panel for the FDA met to discuss whether DXM should be listed as a controlled substance but the panel voted against this measure.[82] At recommended doses, DXM is safe; however, at ten times the recommended dose, it produces hallucinations.[83]
- DXM is chemically related to PCP and ketamine. Young people who use DXM often use alcohol and illegal drugs in conjunction with it. DXM contributes to injuries and fatalities because one's judgment is impaired. When used with Ecstasy, DXM can cause hyperthermia.[84]

SIDE EFFECTS OF ANTIHISTAMINES

- Dizziness
- Weakness
- Nervousness
- Poor concentration
- Headache
- Drowsiness
- Blurred vision
- Difficulty urinating
- Constipation
- Hives
- Dry mouth, nose, and throat

A productive cough helps respiration by removing mucous secretions and foreign matter from the lower respiratory tract. Cough syrups that increase mucous secretions, making a cough productive, are called **expectorants**. The most common expectorant, guaifenesin, is found in Nortussin, Anti-Tuss, and Robitussin. If large amounts are consumed, expectorants produce drowsiness, nausea, and vomiting.

At least 80% of cough and cold remedies are unnecessary.[85] Studies have cast doubt on the efficacy of codeine. Moreover, codeine produces a number of adverse effects.[86] Sucking on hard candies can be just as effective in increasing mucous secretions and relieving throat irritation.

Decongestants

Decongestants constrict blood vessels of the nasal passages, improve air flow, and obstruct secretions that

go to the back of the throat. Although decongestants are effective, they do have drawbacks. Some produce a **rebound effect**, in which the congestion becomes worse than it was originally. Increasing the intake of decongestants exacerbates the rebound effect. Dependency on decongestants is possible. Instructions in nasal spray packages indicate that they should not be used for more than three consecutive days.

Because antihistamines in decongestants shrink swollen nasal passages and relieve sinus headaches, they alleviate allergies. One decongestant is **pseudoephedrine**, the active ingredient in the OTC decongestant Sudafed. Side effects of pseudoephedrine include dry mouth, anxiety, dizziness, tremors, tachycardia, vomiting, nausea, headache, difficulty urinating, and insomnia.

Antacids

As a result of eating habits and lifestyle, stomach-related problems are prevalent. The so-called good life has wreaked havoc on our sedentary bodies. Advertisers constantly remind us that upset stomach, acid indigestion, heartburn, constipation, and diarrhea are annoyances that are easily remedied by using their products. In response, U.S. residents spent more than $1.2 billion in 2011 on the top five antacids.[87] What causes the stomach to be irritated in the first place? The culprit is **hydrochloric acid**, which aids in digestion but also aggravates the stomach's lining. It is estimated that almost three-fourths of adults suffer from indigestion or heartburn.[88] Antacids curtail stomach acidity[89] but have many side effects. Therefore, the FDA established guidelines for antacids: They should not be used for more than two weeks at a time, and if a problem persists for more than two weeks, the user should consult a physician. Some antacids have high sodium levels, which can cause either constipation or diarrhea.

Liquid antacids are more effective than tablets. A tablet should be taken with a full glass of water. Effervescent tablets should be dissolved completely. Also, aspirin and antacids should not be taken at the same time because this combination can increase stomach upset. Although antacids are relatively safe, one concern is that they could mask symptoms of more serious underlying problems.[90] Also, some antacids impair calcium absorption, resulting in an increase in broken bones for people as they age.[91] In addition, antacids may interfere with the function of certain antibiotics.[92]

Sodium Bicarbonate

A popular antacid used to neutralize excess stomach acid is Alka-Seltzer. A primary ingredient in Alka-Seltzer is **sodium bicarbonate**, otherwise known as baking soda. People with high blood pressure have to monitor their sodium intake. Because sodium bicarbonate can raise blood pressure, people with hypertension should know which antacids contain it. Side effects related to sodium bicarbonate are belching and flatulence. Although neither of these effects is fatal, they can be uncomfortable and embarrassing.

SUGGESTIONS FOR PREVENTING INDIGESTION AND HEARTBURN

- Avoid big meals. They make the stomach work longer and harder, producing more acid.
- Eat more slowly. Eating quickly stimulates the stomach to produce extra digestive acids.
- Do not lie down right after eating. Gravity prevents food from passing through the intestines quickly.
- Avoid tight-fitting clothing. It constricts the stomach and forces stomach acid into the esophagus.
- Reduce caffeine consumption. Caffeine makes the stomach produce more acid.
- Avoid foods with high acid content. Examples are citrus fruits and tomatoes.
- Reduce alcohol and tobacco use. Both cause irritation to the stomach lining.
- Raise your head slightly while sleeping. Gravity forces digestive acids to go toward the stomach rather than the esophagus.

Source: T. Cramer, "When Do You Need an Antacid?" *FDA Consumer* (January–February 1992): 19–21.

antitussives Drugs that act as cough suppressants

codeine A mild narcotic that suppresses coughing; a derivative of opium

dextromethorphan (Delsym) An over-the-counter nonnarcotic drug found in cough preparations

expectorants Cough medicines that make a cough productive by increasing mucous secretions

decongestants Substances used to relieve congestion

rebound effect The side effects produced by a drug that make a condition worse than it was originally; e.g., sinuses become more congested by nasal sprays

pseudoephedrine A nasal decongestant

hydrochloric acid Acid in the stomach that can ease digestion and irritate the stomach lining

sodium bicarbonate Baking soda; an ingredient in antacids designed to neutralize excess acid in the stomach