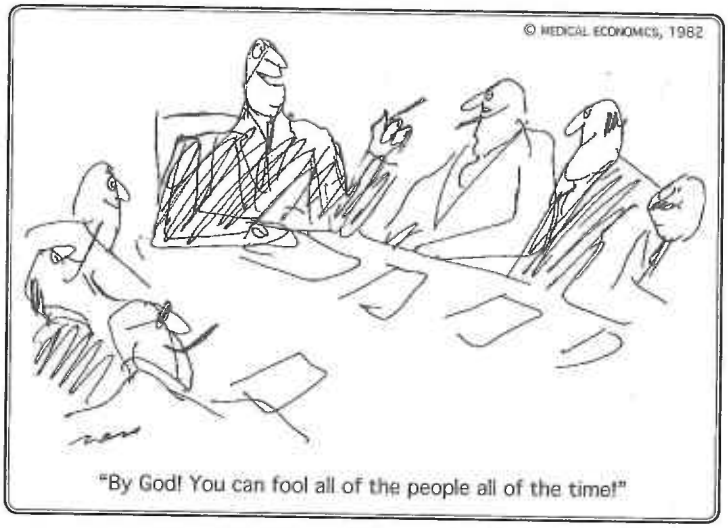
Chapter Two

SEPARATING FACT FROM FICTION



"By God! You can fool all of the people all of the time!"

One of the factors that makes America great is our freedom of speech. To maintain this freedom, we must also run a risk. False prophets can get up on pedestals (such as radio and television talk shows) and tell you almost anything they please.

GABE MIRKIN, M.D.[1]

Finding the occasional straw of truth awash in a great ocean of confusion and bamboozle requires intelligence, vigilance, dedication and courage. But if we don't practice these tough habits of thought . . . we risk becoming a nation of suckers, up for grabs by the next charlatan who comes along.

CARL SAGAN[2]

An inability to comprehend even basic statistical concepts can transform modern youth into victims in search of an irrational belief system that will needlessly harm, panic, and abuse.

PASQUALE ACCARDO, M.D.
RONALD LINDSAY, M.D.[3]

Be careful about reading health books. You might die of a misprint.

MARK TWAIN

Key Concepts

Keep These Points in Mind as You Study This Chapter

- Scientific methods are essential for validating health claims and other information.
- Under the rules of science (and consumer protection), those who make a claim bear the burden of proof.
- Scientific research requires proper study design, the highest possible accuracy of measurement or observation, and appropriate statistical analysis of the findings.
- Don't assume that information is valid simply because it is broadcast or published. No magical superforce is protecting the marketplace against misinformation.
- The best way to avoid confusion is to use trustworthy sources of information. It is far more sensible to use reliable "information filters" such as *Consumer Reports on Health* rather than trying to integrate newsbits on one's own.

The interest Americans have developed in maintaining and improving their health has been accompanied by a tremendous increase in the amount of information available. Thousands of health-related books, videotapes, and CD-ROMs are published each year. Radio and television stations conduct special programs on health issues, employ physicians as commentators, and broadcast infomercials and talk shows on which health matters are discussed. Newspapers, magazines, and newsletters cover health issues in news articles and feature stories. Health products are widely advertised. Ideas and experiences are also being shared through the Internet. Unfortunately, much of this information is misleading.

Consumers who wish to make intelligent decisions about health matters must address several questions: What are scientific facts? How can they be identified? To what extent should people believe what they read and hear? Where can valid information be found? This chapter explains how scientific methods are used to determine facts, how health information is disseminated, and how reliable information can be obtained.

How Facts Are Determined

Reliable health information comes primarily through exposing hypotheses (assumptions) to critical examination and testing. Hypotheses are scientific only if they are testable and can predict measurable events.

The scientific method offers an objective way to evaluate information to determine what is false. It does not rely on testimonials as evidence of fact. Rather, it provides an objective way to collect and evaluate data. Astronomer Carl Sagan said that "science is a way of thinking much more than it is a body of knowledge." He also noted[2]:

> At the heart of science is an essential tension between two seemingly contradictory attitudes—an openness to new ideas, no matter how bizarre and counterintuitive they may be, and the most ruthless skeptical scrutiny of all ideas, old and new. This is how deep truths are winnowed from deep nonsense. Of course, scientists make mistakes in trying to understand the world, but there is a built-in error-correcting mechanism: The collective enterprise of creative thinking and skeptical thinking together keeps the field on track.

The scientific method has at least three noteworthy characteristics:

First, it is self-correcting. Scientists do not assume that this method discovers absolute truth but rather that it produces conclusions that subsequent studies may modify. In this sense, science is cumulative.

Second, the scientific method requires objectivity. Findings must not be contaminated by the personal beliefs, perceptions, biases, values, or emotions of the researcher. Research results often lead to new questions that should be explored.

Third, experiments must be reproducible. One study, taken alone, seldom proves anything. To be valid, one researcher's findings must be repeatable by others. As summarized by Haack[4]:

> What is distinctive about inquiry in the sciences is . . . systematic commitment to criticism and testing, and to isolating one variable at a time; experimental contrivance of every kind; instruments of observation from the microscope to the questionnaire; sophisticated techniques of mathematical and statistical modeling; and the engagement, cooperative and competitive, of many persons, within and across generations, in the enterprise of scientific inquiry.

The long list of references cited in Chapter 15 of this text illustrates the enormous amount of effort that can be involved in developing important conclusions.

Research Design

Scientific research requires proper study design, the highest possible accuracy of measurement or observation, and appropriate statistical analysis of the findings. The conclusions are then used to develop new theories or modify old ones.

Science writer Rodger Doyle[5] has compared the types of studies medical scientists use to investigate health and disease:

CASE STUDIES involve systematic observation of people who are ill.

LABORATORY EXPERIMENTS include studies of animals, living tissue, cells, and disease-causing agents.

EPIDEMIOLOGIC STUDIES analyze data from various population groups to identify factors related to the occurrence of diseases.

CONTROLLED CLINICAL TRIALS offer the most credible evidence.

Anecdotal reports are personal observations that have not been made under strict experimental conditions. Competent researchers may use anecdotes for suggesting new hypotheses, but never as supporting evidence. The fact that a person recovers after doing something is rarely sufficient to demonstrate that the recovery was caused by the action taken and is not simply coincidental. Moreover, reports of personal experiences can be biased, inaccurate, or even fraudulent. Well-designed experiments involving many people are needed to establish that a treatment method is effective. Without them, even honest, competent doctors can be misled by their clinical experiences.

Epidemiologists search for "risk markers" (predictors of a disease) by comparing people with different characteristics.[6] These markers can include personal characteristics (e.g., weight, blood cholesterol levels), personal activities (taking vitamins, exercising regularly, smoking cigarettes), and environmental factors (inhaling radon gas or tobacco smoke) that are statistically related to specific diseases. Before concluding that any relationship is causal rather than coincidental, however, epidemiologists must consider: (a) the strength of the association, (b) the consistency of the association in different studies, (c) whether it is clear that the risk marker preceded the disease, (d) whether the dose and not just the mere presence of the marker predicts disease risk, and (e) whether, in light of what else is known, it appears logical that the marker is responsible.

Controlled clinical trials compare an experimental group of people who receive the treatment being tested and a control group of people who receive a different treatment or no treatment. For example, members of the experimental group may receive a pill with active ingredients, whereas those in the control group receive another treatment, an inert substance (placebo), or no treatment. Studies may be conducted "blind" or "double-blind" to minimize or eliminate the effect of bias on data collection and interpretation. In blind studies the participants do not know which treatment they receive. In double-blind studies neither the people administering the treatment nor the experimental subjects know who gets what. In crossover studies participants in two or more groups are switched from one intervention to another after a specified period of time. Some studies do not use control groups. Ernst and others[7] have warned that experimental subjects who receive placebos should not be classified as "untreated" and that many people fail to distinguish between a placebo response and the improvement that results from the natural course of an illness. Chapter 3 discusses this subject further.

Large, randomized, well-controlled, double-blind studies in which several medical centers participate are considered the gold standard of research trials.[8] Because such studies are very expensive to conduct, they are reserved for questions of great importance. Long-term research ("outcomes research") is also needed to compare the effectiveness of proven alternatives.[9] Table 2-1 illustrates the typical steps in a clinical investigation.

It is important that research findings not be overgeneralized. Conclusions based on data from one population may not apply to another, and the results obtained from animal or test-tube studies may not be applicable to humans.

The importance of scientific testing was strikingly demonstrated by a study of mammary artery ligation, a surgical procedure used in the 1940s and 1950s for

◆ Personal Glimpse ◆

The Scientific Method in Action[10]

In 1978 researchers at Mt. Sinai Hospital in Miami Beach, Florida, compared the effects of chicken soup, cold water, and hot water on the clearance rate of nasal mucus. Each liquid was consumed through a straw from a covered cup or open vessel. A videotaping system was used to record the advance of tiny radioactive discs as mucus carried them out the nose. Cold water slowed mucus flow, but chicken soup and hot water sipped from an open cup speeded it up. Since chicken soup outperformed hot water, the researchers concluded that it appeared to have a special ability to clear a stuffy nose. Mom and Grandma were right!

Table 2-1

TYPICAL STEPS IN A CLINICAL INVESTIGATION

Step	Example
A question or problem is identified.	What is the effect of vitamin C on the common cold?
A hypothesis is formulated.	Supplementation with vitamin C can reduce the incidence of colds.
A limited aspect of the hypothesis is selected for testing.	Will daily administration of 1000 mg of vitamin C prevent colds?
A study is designed.	Sixty adults will be given 1000-mg tablets of vitamin C daily for 4 months, and 60 of comparable age, race, sex, and health status will be given an inactive substance [placebo tablets]. The participants will not know which they receive (a blind study).
The study is conducted.	Volunteers are obtained and instructed on how to proceed.
Data are collected, recorded, and tabulated.	There were six colds in the vitamin C group and seven in the placebo group.
The data are analyzed to determine whether the results appear significant or were likely to occur by chance alone.	The small difference between the two groups could easily have occurred by chance alone and therefore is not "statistically significant."
A determination is made on whether hypotheses have been supported or refuted.	The hypothesis was not supported. The experiment found no evidence that vitamin C supplements reduce the incidence of colds.
The study may be repeated by the researchers or by others to verify their results or conclusions.	Many double-blind experiments have found that supplementation with vitamin C does not prevent colds (see Chapter 12).
Studies relevant to this area are reviewed.	Skilled reviewers agree that enough well-designed studies have been done to conclude that vitamin C megadoses do not prevent colds.

treating angina pectoris (chest pain resulting from coronary artery disease). Proponents believed that tying off the mammary arteries stimulated the growth of new blood vessels that would increase the supply of blood to the heart muscle. The procedure was considered effective until double-blind controlled tests demonstrated that pretending to operate (merely cutting the skin of the patient's chest wall) was as effective as tying off the mammary arteries.[11]

Misuse of Statistics

Many people tend to accept statistical data without question. To them, any information presented in quantitative form is correct. Advertisers, quacks, and pseudoscientists often cite invalid data or misrepresent valid data to promote their wares. The following statistical errors can cause confusion:

BIAS: A factor that may cause people to make erroneous observations or draw erroneous conclusions. For example, in a study of vitamin C and the common cold, participants who knew they were taking vitamin C reported fewer colds than those who were taking it but did not know it.[12]

OMISSION OF AN IMPORTANT FACTOR: Many individuals who feel helped by an unorthodox remedy have taken it together with effective treatment but credited the unorthodox remedy.

NON SEQUITUR: The stated conclusion does not follow from the facts.

INSUFFICIENT DATA: Small amounts of data limit the certainty of results. Tests done on small numbers must usually be confirmed by larger studies.

NONCOMPARABLE DATA: Valid comparisons can be made only if data are logically comparable.

NONREPRESENTATIVE DATA: Improper sampling techniques (lack of random sampling) may yield data that do not accurately represent the study population or group. For example, to determine which car the average American likes best, it would not be appropriate to poll only owners of one make of car, those living in one region, or even those listed in a telephone book (since many people have a nonpublished number, a cell phone, or no telephone). Similarly, the finding that vitamin supplementation reduces the incidence of cancer in a population of malnourished rural Chinese is not relevant to well-nourished urban Americans. Figure 12-1 provides another example.

CONFUSION OF ASSOCIATION AND CAUSATION: Things that occur together may not be causally related. Recovery after taking a remedy may simply be a result of the natural course of an illness.

In *How to Lie with Statistics*, Darrell Huff[13] describes how drug research data can be misrepresented by using biased samples, meaningless averages, purposeful

omissions, apples-and-oranges comparisons, illogical conclusions, and deceptively drawn charts. He notes that a basic technique used by charlatans when they present testimonial evidence is the *post hoc, ergo propter hoc* fallacy: "This happened after that, therefore this was caused by that." The fact that someone who smokes 50 cigarettes and drinks heavily each day lives to age 95 does not mean that these habits are healthful. Huff says that to analyze a statement, one should ask, "Who says so? How does he know? How did he find out? Is anything missing? Does it all make sense?"

Manufacturers are quick to take advantage of preliminary research that may appear to support increased use of their products. In 1988 the Physicians' Health Study Group[14] reported that aspirin use every other day had reduced the incidence of heart attacks among 11,000 generally healthy physicians. The researchers concluded that although aspirin might help prevent heart attacks, the study's results should not be applied to the general population and that doctors should weigh potential risks as well as benefits when advising their patients. (Chapter 15 discusses this further.) Within days after the report was published, aspirin ads began referring to it and suggested that consumers ask their doctors whether aspirin might help them. The FDA commissioner, who believed that the ads were likely to encourage inappropriate self-medication, warned manufacturers that aspirin did not have FDA approval for preventing heart attacks in healthy people and that continuing the ads would trigger regulatory action. Fish oils, calcium supplements, antioxidant vitamins, and high-fiber products have also been marketed in ways that oversimplify or exaggerate the significance of research findings.

◆ Personal Glimpse ◆

Self-Persuasion

Charlatans are not the only people who engage in the *post hoc, ergo propter hoc* fallacy. As noted by Lisa Feldman Barrett, Ph.D., professor of psychology at Boston College:

> People try to connect things that happen to them. In doing this, they lean toward ideas that fit their expectations and away from those that do not. Suppose somebody believes that vitamins provide energy. On a day when he feels energetic, he attributes that feeling to the vitamin, rather than to other factors, such as the quality of his sleep the night before. On a day when he feels fatigued, however, he doesn't register the experience as evidence against his belief. The scientific method safeguards against these tendencies by forcing people to look at disconfirmatory evidence and examine alternative explanations.

Peer Review

Peer review is a process in which work is reviewed by others who usually have equivalent or superior knowledge. It may be used during the development or execution of a study, as well as afterward. When studies are completed, researchers strive to publish their results in journals so that others can use or criticize the findings and science can advance. Detailed standards for reporting and evaluating studies have been published.[15] The best scientific journals are peer-reviewed by experts; papers submitted for publication are reviewed by two or more expert referees, then accepted, modified, or rejected by the editor. The peer-review process is imperfect but can usually screen out "obviously flawed and unreliable manuscripts."[16]

Reports from over 4000 peer-reviewed scientific journals are listed in the *Index Medicus* and its online counterpart MEDLINE. (Such listing is a favorable sign but not a guarantee of quality.) The two most prestigious American medical journals are *JAMA* (*Journal of the American Medical Association*) and *The New England Journal of Medicine*. *JAMA* has more than 3000 names in its reviewer-referee file.

Expert review is also done by scientific organizations and government agencies. Several that have established formal review processes that are given great weight by the medical community are described here.

The American Medical Association's Council on Scientific Affairs studies many medical issues and reports to the AMA's House of Delegates. Once accepted, these reports help shape AMA public policies and may be published in *JAMA*. From 1982 through 1998, the Council was assisted by the AMA's Diagnostic and Therapeutic Technology Assessment (DATTA), which evaluated about 10 drugs, devices, procedures, and/or techniques per year. Each evaluation reflected a consensus of experts who judged whether it should be considered safe and effective, investigational, indeterminate, or unacceptable. The topics selected were considered very important or controversial.

The National Academy of Sciences issues the Dietary Reference Intakes (see Chapter 11) and many other reports by expert committees.

The National Institutes of Health Consensus Development Program, begun in 1977, has held about 100 consensus conferences in which experts meet for several days to discuss a topic and issue a report. Except for the acupuncture report (discussed in Chapter 8), the reports reflect a scientific consensus.

The Office of Technology Assessment (OTA), which closed in 1995, was a nonpartisan support agency that provided congressional committees with analyses of emerging, difficult, and highly technical issues. In 1990 it produced an excellent report on unconventional cancer treatments (see Chapter 16).

The American College of Physicians' Clinical Efficacy Assessment Project focuses primarily on relatively new procedures.

The U.S. Preventive Services Task Force publishes recommendations for preventive services that prudent health professionals should offer their patients in the course of routine clinical care. These recommendations, which represent the pooled judgment of many experts, are discussed in Chapters 5 and 20.

The Agency for Health Care Research and Quality (AHRQ), a component of the U.S. Public Health Service, was established in 1989 to enhance the quality, appropriateness, and effectiveness of health services. Formerly called the Agency for Health Care Policy and Research (AHCPR), it has published many clinical practice guidelines with separate versions for clinicians and consumers.

The *Cochrane Database of Systematic Reviews,* updated quarterly, is an electronic journal of systematic reviews produced by the Cochrane Collaboration, an international network of individuals and institutions committed to preparing systematic reviews of the effects of health care and disseminating them on CD-ROM and through the Internet. Established in 1993, it hopes to cover the entire spectrum of medical interventions.[17]

The National Guidelines Clearinghouse (NGC) is an Internet-based public resource sponsored by the AHRQ, in partnership with the AMA and the American Association of Health Plans. The Web site summarizes more than 1700 clinical practice guidelines that have met its criteria.

Scientific Misconduct

Occasionally, individual scientists publish or attempt to publish bogus research data. The extent of this type of fraud is not known, but its existence presents one more argument for replicating studies. Peer review, high-quality journals, and the demand for replication make detection likely when fraud occurs. Physicist David Goodstein, who has worked with federal agencies to develop guidelines for defining misconduct in science, reported that between 1980 and 1987 only 21 cases of misconduct involving doctors or biologists came to light—which was only three ten-thousandths of all scientists who received research grants.[18] Unconfirmed studies, particularly when inconsistent with other studies, seldom have a major impact on what physicians do. Thus, although scientific fraud occurs, it seldom affects patient care.

In recent years, drug companies and researchers have been accused of suppressing studies and data unfavorable to their products.[19] In response to this concern, 11 medical journals announced that in 2005, they would stop considering reports of clinical trials that had not been registered in a public trials registry before or at the time they begin to enroll patients.[20] The need for the policy was underscored by a study of 122 journal articles that concluded that about half of them had been incompletely reported, harm was more likely to be unreported, and 65% had inconsistencies between primary outcomes defined in the most recent protocols and those defined in published articles.[21]

Problems with Health Information

Consumers obtain health information from individuals, educational institutions, and the media. The individual sources include nonprofessionals, pseudoscientists, and professionals. Nonprofessionals include friends, neighbors, relatives, and others who relate their experiences and ideas through informal talks and meetings. The pseudoscientists include charlatans, mavericks, cranks, and quacks. The professionals include practitioners, researchers, and others with specialized training who provide services and information. Educational institutions are schools at all levels that offer not only formal education provided by teachers, but also informal education through personal student contacts. The media include electronic (television, radio, and the Internet) and print (newspaper, magazine, and book) outlets.

Reliability of Sources

It can be extremely difficult for consumers, and sometimes even for health professionals, to determine the reliability of health information. Separating fact from fiction can be a complex and time-consuming process. The reasons for this difficulty include:

- Advice from laypersons may be based on hearsay and personal experience rather than scientific data. Factual information, especially when several individuals are involved, is often distorted in transmission.
- Many false ideas "feel right" or seem commonsensical to people who lack the technical knowledge to evaluate them.
- Preliminary and limited scientific studies may be overemphasized by the media.
- Research data published by experts may conflict sufficiently to cause public confusion.

- Inaccurate health information may be disseminated purely for reasons of self-interest or profit.
- Claims that treatments are based on scientific evidence may not be true. Schick and Vaughn[22] have noted that unscientific practitioners often cite or misconstrue "scientific findings" to support their views.
- "Confirmation bias" can play a decisive role. As noted by Carroll,[23] people tend to give more weight to data that support their beliefs, and those who become blinded to evidence refuting a favored hypothesis "cross the line from reasonableness to closed-mindedness."

Nonprofessionals. Many consumers have misconceptions about the factors that influence health. People who share their experiences and knowledge may believe in unproven and unscientific methods. Such people often are highly motivated to spread their beliefs. Testimonials from movie stars, professional athletes, and other celebrities are commonly used to promote questionable health methods. National organizations exist to promote "alternative" cancer remedies (Chapter 16), the Feingold diet (Chapter 6), and other dubious methods. Millions of people have been involved in the sale of dietary supplements and other products through multilevel companies such as Shaklee Corporation and Amway Corporation (see Chapter 4).[24]

Pseudoscientists. A pseudoscience is a set of ideas put forth as scientific when they are not. Pseudoscientists misuse and distort scientific evidence to support whatever products or services they promote. They may use scientific terminology and data to concoct theories that seem plausible to laypersons. They are often sophisticated in manipulating situations to gain notoriety and acceptance. They may write articles and books and may also reach consumers through television and radio programs. Some are "nutrition consultants" with "degrees" from diploma mills and nonaccredited schools.

Consumer Tip

Any procedure proposed to treat human disease should be subject to the same standards of safety and effectiveness that apply to usual medical procedures. It is, however, unacceptable to require any scientific body to examine every proposed claim. There will never be enough facilities to consider the avalanche of proposals. Very simply, the burden of proof rests with the proponents. Ordinary claims require ordinary proof, and extraordinary claims require extraordinary proof. . . . Testimonials and anecdotal accounts, no matter how enthusiastic, do not constitute proof. Public enthusiasm and interest do not create validity.

Edward H. Davis, M.D.[25]

Several observers have described characteristics that can help consumers distinguish pseudoscientists from true scientists. Hatfield,[26] for example, has noted:

Generally speaking, an establishment scientist has attended and graduated from an accredited university, belongs to one or more well-respected professional organizations, conducts carefully controlled and documented research, and reports these findings in professional journals that maintain high standards for accepting research papers.

By contrast, those claiming to be an alternative to establishment science have no common set of standards or practices from which measurements and comparisons can be made or quality of performance judged. Personal testimonies and causal observations quite often serve as the basis of their research rather than act as the impetus to begin research.

Peterson[27] has likened improperly designed research to a man rowing a boat from only one side:

No matter how long or how hard he works, he never succeeds in doing anything except going in a circle, never realizing that it isn't his dedication or his strength but his method that is flawed. Until fringe research puts both oars in the water, it is doomed to remain where it has always been: spinning aimlessly near the shores of science.

True medical scientists have no philosophical commitment to particular treatment approaches, only a commitment to develop and use methods that are safe and effective for an intended purpose. Several observers have noted that pseudoscientists use hypotheses and data differently from scientists. Whereas scientists test hypotheses, abandon disproved ones, and welcome review of their findings and conclusions, pseudoscientists reject findings that contradict their beliefs and accuse critics of prejudice and conspiracy.[28,29]

In this regard, Criss[30] explains why we should not assume that people with strange ideas are modern Galileos:

To be a true analogy, these people would have to do experiments, make observations, and bring these results for all to see and question in an open forum. Further, they would have to be denied freedom of speech and press, or any expression all over the land—for that was the injunction against Galileo in 1616! It was as a result of this experience that the scientific method was adopted among scientists. . . . It has allowed the replacement of old ideas with new ones, and has provided a means of judging, and discarding, unfounded ideas.

Beyerstein[31] has noted that "alternative" practitioners rarely produce scientific data:

Unless an unconventional therapist keeps detailed records of a sufficiently large number of patients with the same complaint, we have no way of knowing whether the reported number of "cures" exceeds the normal unaided rate of recovery for the

symptoms in question. Fringe practitioners rarely keep such data, preferring to publicize lists of satisfied customers rather than the percentage of the total cases that they represent. In addition, because alternative healers practically never carry out long-term follow-up studies, neither do we know how many of their clients receive temporary symptom relief rather than a genuine cure.

Professionals. Most health professionals give reliable advice, but scientific training does not guarantee reliability. For example:

- Adelle Davis promoted inaccurate and dangerous nutrition advice despite adequate training in nutrition. As noted in Chapter 13, many of the scientific studies she cited to back up her theories had no relevance to them.
- Dr. Robert Atkins, best known for his low-carbohydrate diet, promoted many types of disreputable treatments (see Chapter 13).
- Dr. Andrew Ivy, a respected scientist, withdrew from the scientific community at the height of his career to promote the quack cancer remedy krebiozen (see Chapter 16).

Chapters 3, 6, 7, 8, 12, and 25 of this book provide information on how to identify professionals who engage in unscientific practices.

Many lines of questionable nutrition products have been marketed with endorsements by scientists with respectable credentials. The most notable case occurred with United Sciences of America, Inc., a multilevel company that sold dietary supplements claimed to be effective in preventing cancer, heart disease, and many other diseases. Literature from the company said that its products had been designed and endorsed by a 15-person scientific advisory board that included two Nobel prize-winners. However, four members of the board told investigators that they had neither designed nor endorsed the products. A few other multilevel companies claim to be guided by scientific boards, and a few supplement manufacturers have used endorsements by individual practitioners in advertisements. Barrett,[32] who believes that all such practitioners hold minority viewpoints, has warned:

> Vitamin product endorsements by doctors—no matter how prestigious they are—should be viewed with extreme caution. All I have seen so far have included claims that were unproved and also illegal.

Educational institutions. Educational standards are maintained through a system of accreditation by agencies approved by the U.S. Secretary of Education or the Council on Recognition of Postsecondary Accreditation. Accredited institutions tend to have well-trained faculty members and to provide reliable guidance to their students. Schools of chiropractic, naturopathy, and acupuncture are exceptions because much of what they teach is based on false beliefs (see Chapter 8). Nonaccredited schools that teach health subjects tend to be unreliable, and some are diploma mills that issue "degrees" and certificates whose only requirement is the payment of a fee. Chapter 12 discusses the problem of bogus nutrition credentials.

Many elementary and high school teachers of health subjects have had minimal formal training in these subjects and hold beliefs similar to those of the general public. Consequently, many misconceptions are passed from teacher to student. In 1983, Dr. Roger Lederer, professor of biology, and Dr. Barry Singer, associate professor of psychology, California State University,[33] noted that problems existed even at universities:

> In recent years the teaching of pseudoscience and quackery in universities has become common and apparently accepted under the aegis of academic freedom. Typically the material is not formally presented as "Pseudoscience 101," but is offered as a component of a regular course.

Over the years, at many schools, the situation has become even worse. As Mole[34] has summarized:

> "Science and society" classes do not nurture the critical thinking abilities of students. They only nurture a deep suspicion toward all truth claims, particularly those claims perceived to clash with the political ideals of students. . . . If there are no valid criteria for accepting the truth of science, then virtually any idea about the empirical world is valid and there are no authoritative reasons to reject or accept any particular idea.

Many medical schools, hospitals, and professional organizations offer courses they identify as "alternative," "complementary," and/or "integrative" methods. Some are appropriately critical, but most provide a forum for promoters. The Accreditation Council for Continuing Medical Education (ACCME) states that "all the recommendations involving clinical medicine in a CME activity must be based on evidence that is accepted within the profession of medicine as adequate justification for their indications and contraindications in the care of patients." However, the ACCME has been very lax in enforcing this policy.[35] As a result, chelation therapy, bogus anti-aging practices, homeopathy, and many of the other dubious methods mentioned throughout this book are promoted through organizations that the ACCME accredits.

Print and Electronic Media

Max Gunther[36] has succinctly described the role of the media in disseminating health information:

The media have four main functions: to entertain, to inform, to carry advertisements, and to make money for their stockholders. Because of the ways in which these functions are carried out, and the peculiar and intricate ways in which they are connected, an appalling amount of misinformation—ranging from the faintly biased to the downright wrong—is fed every day to an unfortunately gullible public. Hardly anywhere is this more evident than in the fields of medicine and its unwanted cousin, medical quackery.

Publicity is obviously a major factor in the success of quackery. Controversy often works to the advantage of quacks. During the mid-1970s Laetrile (amygdalin) promoters skillfully orchestrated publicity to increase their public following. Court cases of children whose parents wished to withhold conventional therapy became a rallying point. Laetrile supporters who sincerely believed it had saved their lives gained access to national television, where they appeared quite credible.[37] During the past several years chiropractic, homeopathy, and other "alternative" methods have received considerable publicity in mainstream publications with little or no attempt to examine their shortcomings.

When the media attempt to present health information, problems are often evident: (a) coverage of a subject is inadequate because of the limited time allotment; (b) selection or screening of speakers or subject areas is poor; (c) pseudoscientific claims often are presented without rebuttal from qualified experts; (d) attempts are made to sensationalize and over-dramatize preliminary or new findings, especially about cancer, heart disease, arthritis, or alleged environmental dangers (see Figure 2-1); and (e) attempts are made to attract large audiences with claims that "alternative" methods are effective. Koren and Klein[38] have noted that the media have a natural tendency to report more on positive medical findings than on negative ones. This tendency contributes to the difficulty laypersons have in placing medical news in perspective.

Barrett and Herbert[39] note additional factors in the spread of misinformation by the media:

- Magical claims about health methods tend to be regarded as more newsworthy than established facts. Nationally televised talk shows provide enormous publicity for promoters of quackery.
- Time works to quackery's advantage. It is much easier to report a lie as a straight news event than to investigate it.
- Some journalists who have been misled by false ideas cannot write accurate reports.
- Most promoters of health misinformation are regarded as underdogs in a struggle against the establishment. As such, they tend to be treated with undeserved sympathy. Most editors insist that articles that attack false ideas be balanced so that the apparent "underdog" gets a fair hearing. Even science editors rarely feel a duty to issue effective public warnings against misinformation.
- Many more people are actively promoting misinformation than are actively opposing it. The sheer force of numbers works against the truth.
- Publications that accept ads for food supplements may be unwilling to risk offending their advertisers. For example, when *Self* magazine published an article by a freelance writer listing money-saving tips from the 1980 edition of this book, a tip about spending less money on vitamins was deleted from the writer's manuscript by the magazine's editors.
- Many editors fear that attacks on nutrition quackery will stir up controversy from readers who regard nutrition as their religion.
- Many editors fear that attacking the credibility of a quackery promoter will result in a libel suit.

Although libel suits related to health issues are extremely rare, other forms of economic reprisal are not. Some manufacturers cancel or threaten to cancel ads when magazines run articles that criticize their products, and "alternative" practitioners often initiate letter-writing campaigns or cancel their subscriptions when publications criticize their methods. After publication of the third and fourth editions of *Consumer Health*, chiropractors attempted to execute a boycott[40] and bring other pressure on the publisher to make the book's discussion of chiropractic more favorable.

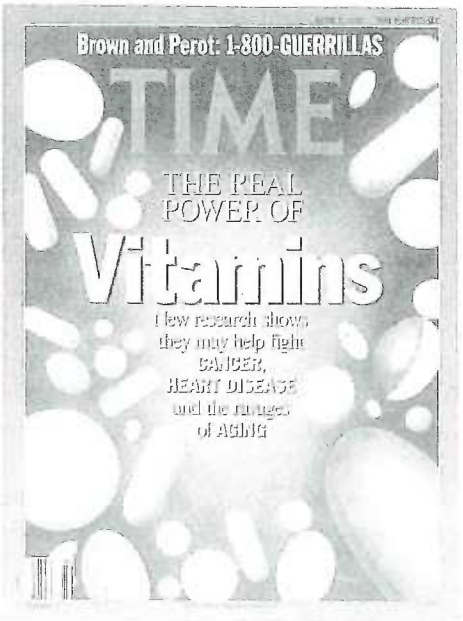


FIGURE 2-1. Magazine cover, 1992. Sales for this issue topped all others duing the first half of the year. The six-page story, which speculated about antioxidant vitamins, was hailed by the health-food industry as a "watershed" event. In 1996, after studies refuting these speculations were published, *Time* covered the subject only briefly.

Many publications use sensational claims to generate sales. Tabloids and women's magazines, for example, frequently carry articles on "quickie" reducing diets or "superfoods." Marilynn Larkin,[41] a freelance writer in New York City, has noted that topic selection is commonly based on sales appeal rather than scientific merit. Even a well-written article may be accompanied by a sensational headline that contradicts the article itself. Newspaper headlines are often composed by an editor who did not write the article and is not well-versed in the subject matter.

Lack of peer review. Scientists are generally eager to point out the deficiencies in each other's theories and experimental techniques. The comparable goal of most journalists is to report what happens. Journalists almost never publicly criticize each other's coverage of the news. This is particularly true when health topics are involved. Stories about "alternative" methods rarely enable readers to judge whether proponents' claims are true. *Skeptical Inquirer* and the antiquackery Web sites are among the very few that publish unrestrained criticisms of poor reporting.

The National News Council was founded in 1973 "to serve the public interest by . . . advancing accurate and fair reporting of news." It investigated complaints alleging unfairness, inaccuracy, or breaches of ethical standards by wire services, newspapers, news syndicates, news magazines, and television and radio networks and stations. The Council exerted some pressure on media outlets, but its findings were not widely publicized. It ceased operation in 1984, citing lack of media support as the primary reason. Some newspapers have referees (ombudsmen)[42] to whom complaints can be made, but misleading health reports are rarely investigated.

Advertisements. Many periodicals contain ads encouraging their readers to buy vitamins and minerals, herbs, wrinkle removers, weight reducers, headache-relief drugs, pep pills, and various other health-related products. Advertising, however, is frequently misleading—often deliberately so. Advertising claims often have multiple meanings, one or more of which may be false. Many ads describe a product in terms of a mystical ingredient rather than specific contents or values.

Advertising dollars can also affect what gets published. Gunther[35] has observed: "Fear of losing good advertisers is one of the common reasons why worthless medicines and gadgets and treatment methods get free plugs and why you do not see honest medical rebuttals printed as often as could be wished." Chapter 4 discusses this subject further.

Newspapers. Many newspapers use overdramatization of incidents, inaccurate or exaggerated reports, quotations from unreliable sources, and misleading headlines to attract reader interest and attention. The weekly tabloids are notorious for this. Headlines like the following from tabloid newspapers have no credibility:

Doctors Reveal Amazing Healing Powers of Water
Men Who Eat Slowly Make Better Lovers
Pizza Cuts Heart Attack Risk
Miracle of the Roses . . . Blooms From Shrine Are Curing Cancer, Arthritis and Even AIDS!
Researchers Claim Vasectomies May Lead to Heart Disease
Stars Use Crystals to Cure All Their Ills
Thousands Claim Cures From Radioactive Caves
Tomorrow's Drugs Will Make You Happier, Smarter, and More Creative
Vitamins—Guaranteed to Boost Energy and Slow Aging
World's Greatest Diet Pill—Eat What You Want and Still Lose 20 Pounds a Month

In 1987 Dr. Stephen Barrett[43] analyzed 322 articles on health, nutrition, and psychology appearing in five tabloid newspapers during a 3-month period and concluded that only 135 (42%) were reliable. A *National Examiner* article, for example, claimed that "a miraculous diet pill will flatten your tummy . . . and you can do it fast without a complicated diet program." The article discussed the Optifast system of weight control, a reputable medically supervised program. However, the program was not simple, the results were not instant, and the pills involved did not cause weight loss but simply added nutrients to the low-calorie program. Another article, "Bug Spray Makes Your Bosom Bigger," was accompanied by a photo captioned, "Flat-chested girls could look like Dolly Parton." The article stated that 30 men suing a federal detention center had claimed that exposure to a chemical intended to kill lice caused painful enlargement of their breasts. Nothing in the article indicated that the chemical is useful for women.

Dr. Barrett also examined 247 articles involving supernatural beliefs, faith healers, psychics, alleged kidnappings by space aliens, and similar topics. All but eight presented such occult events as factual.

Consumers should be wary of reports indicating that studies were completed on small numbers of subjects, done in foreign countries (evidence of accuracy is more difficult to ascertain), or based on animal studies alone. Preliminary findings can be important, but they do not become established as facts unless additional studies support them.

Even well-written articles about preliminary developments sometimes carry misleading headlines or begin with words that exaggerate their significance. For example, an article in the *San Francisco Examiner and Chronicle* had this headline: "New Hay Fever Drug May Replace Antihistamines." The article said the substance had to be inhaled, would require two-thirds fewer antihistamine tablets to control symptoms, and would not cause drowsiness. Later in the article, however, an allergy authority said it would work only for a small number of patients and would not replace antihistamines.[44]

Magazines and newsletters. Magazines and newsletters differ widely in the accuracy of the information they publish. Table 2-2 summarizes an evaluation by the American Council on Science and Health[45] of the nutrition information in 20 popular magazines from 2000 through 2002. Up to 10 articles from each magazine were examined for accuracy, readability, substantiation of contents, and reliability of recommendations. Twelve of the magazines were rated "good," with *Parents*, *Ladies Home Journal*, and *Cooking Light* scoring highest.

The major news magazines, *Time, Newsweek,* and *U.S. News & World Report*, are good sources of news on general health topics. Their articles are usually timely, well-written, and based on interviews with recognized experts. However, all three of these magazines have publicized news about "alternative" health methods without appropriate critical analysis.[46] *Newsweek* has also published several unduly alarmist articles about environmental factors and co-sponsored the 1996 Las Vegas Health Show, a large exposition at which many speakers and exhibitors promoted unscientific methods.

Table 2-2

NUTRITION ACCURACY OF POPULAR MAGAZINES (2000–2002)

Magazine	Score*	Comments
Parents	89	Provides good advice, based on scientifically sound information
Ladies Home Journal	89	Tied for first place, with impressive improvement over previous performance
Cooking Light	88	Did fine job of providing accurate scientific information, but a few recommendations were not fully justified
Better Homes & Gardens	87	Sound, practical advice, but a few errors were noted in articles dealing with beverages
Health	87	Some articles received top marks, but others included some poorly substantiated claims
Consumer Reports	86	Most articles provided accurate information, but a few seemed alarmist or unclear in their recommendations
Good Housekeeping	86	Objective, logical reporting, but had weakness in some weight-control articles
Runner's World	85	Some articles were well researched and well balanced; others included questionable claims
Reader's Digest	83	Articles generally good, but some had factual errors or inadequate documentation
Redbook	82	Mostly well balanced and documented, but some factual errors
Woman's Day	82	Generally good, but some factual errors and misinterpretations
Prevention	82	Compilation articles included a mixture of sound information and inadequately supported statements
Glamour	81	Mostly acceptable, but some poorly supported ideas were included
Fitness	81	Most articles received mixed reviews; items in compilation articles were often too short to cover topics adequately
Shape	80	Mixed very good and less successful articles; several problems were noted in compilation articles
Self	80	Full-length articles were better than those consisting of news compilations
Cosmopolitan	78	Some articles included inaccurate information or lacked precautionary statements
Men's Health	71	Tendency to exaggerate the significance of tenuous links between foods and health effects
Muscle & Fitness	68	Dietary supplement articles ranged from speculative to dangerous
Men's Fitness	68	Needs more attention to sound science and supplement safety issues

*Excellent: 90; Good: 80-89; Fair: 70–79; Poor: less than 70. Source: American Council on Science and Health.[45]

Table 2–3

Health and Nutrition Periodicals Aligned with the Scientific Community

Each of the newsletters and magazines in the chart below presents valuable information. Some deal with controversial topics much more than others, whereas some deal with them less accurately than others. Some cover many topics superficially, whereas others cover fewer topics deeply. Some balance this mix according to the importance of the topic. Generally the broader the scope, the less thorough, and vice versa.

R = How reliable?
D = How thorough?
P = How practical?
S = How broad a scope?
T = How timely?

4 = Excellent
3 = Good
2 = Fair
1 = Inconsistent
0 = Poor

	General Topics					Quackery			
General Health Newsletters	**R**	**D**	**P**	**S**	**T**	**R**	**S**	**T**	**Comments**
Consumer Reports on Health	4	4	4	4	4	4	3	4	Outstanding; packed with practical information
Harvard Health Letter	3	4	4	4	4	3	4	4	Excellent reports on research findings, but some articles on "alternative" methods have been careless
Harvard Heart Letter	4	4	4	–	4	4	–	4	Outstanding but limited to cardiovascular topics
Harvard Women's Health Watch	3	4	4	4	4	2	2	4	Some articles on "alternative" methods have been promotional
HealthNews	3	4	4	4	4	3	4	4	In-depth interpretations of recent scientific findings, but inconsistent about "alternative" methods
Health Over 50 (Johns Hopkins Medical Letter)	4	4	4	3	4	4	3	4	Excellent and timely
Mayo Clinic Health Letter	4	3	4	4	4	4	3	4	Excellent and timely
Public Citizen HRG Health Letter	3	3	2	1	4	4	2	2	Unduly negative about health marketplace; some conclusions based on inadequate data sampling
University of California at Berkeley Wellness Letter	3	4	4	4	4	3	4	4	Generally excellent, but editors unwisely advise everyone to take antioxidant vitamins
Nutrition Newsletters									
Environmental Nutrition	3	3	4	3	4	3	3	3	Best features are news and book reviews; some articles about vitamins have been inaccurate
Nutrition Action	3	3	3	2	3	3	1	3	Alarmist attitude toward nutrition and food safety
Tufts University Health & Nutrition Letter	4	4	4	4	4	4	4	4	Outstanding, informative, and practical
Magazines amd Journals									
FDA Consumer	4	4	4	3	4	4	3	4	Focuses on foods, drugs, devices, and FDA enforcement; full text available at www.fda.gov/fdac
Health	3	3	3	4	4	3	3	3	Advice often accurate but superficial; some articles on "alternative" methods have been promotional
Scientific Review of Alternative Medicine	4	4	4	4	4	4	4	4	Detailed, incisive analyses

The following are not recommended because they promote unscientific and/or unproven methods. Some are no longer published.

Newsletters: Allergy Hotline; Alternative Health Issues; Alternatives (written by David Williams, D.C.); Antha; Better Ways to Health; Bio-Probe Newsletter; Bottom Line Health; Cancer Chronicles; Dr. Atkins' Health Revelations; Dr. William Campbell Douglass' Real Health; Forefront; Health & Healing; Health Alert; Health & Longevity; Health Resource Newsletter; Health Wisdom for Women; HealthBeat; HealthFacts; Healthy Talk; The International DAMS Newsletter; The John R. Lee, M.D., Newsletter; The Lark Letter; The McDougall Newsletter; The Mindell Report; NaturalCures newsletter; Naturally Well; New Century Nutrition; Nutrition & Healing; Nutrition Insight; Nutrition News (edited by Siri Khalsa); The Nutrition Reporter; Options; Organic Food News; People's Medical Society Newsletter; Price-Pottenger Nutrition Foundation Health Journal; Prescriptions for Healthy Living; Pure Facts; Self Healing; What Doctors Don't Tell You; Women's Health Advocate; Your Good Health.

Magazines: Alive; Alternative Medicine Digest; American Journal of Natural Medicine; Better Nutrition for Today's Living; Body and Soul; The Choice; Choices; Counselor; Delicious!; Digest of Alternative Medicine; Energy Times; Explore More!; Flex; Good Medicine; Health Counselor; Health Freedom News; Health Science; Health World; Healthier Times; HealthKeepers; Healthy & Natural; Healthy Living; Herbs for Health; Holistic Medicine; The Human Ecologist; Innovation; Journal of Longevity; Journal of Longevity Research; Let's Live; Life Extension; Massage & BodyWork; Muscle & Fitness; Muscular Development; Natural Health; The Natural Way; New Age Journal; New Body; Newlife; Nutrition & Fitness; Nutritional Perspectives; Prevention; Prime Health & Fitness; Psychology Today; Search for Health; Senior Health; Total Health; Townsend Letter for Doctors and Patients; Vegetarian Times; Your Health.

Many periodicals specialize in health-related information. Dr. Barrett, who monitors more than 40 of them, has summarized his ratings in Table 2-3.

Books and other literature. Thousands of health-related books, booklets, and pamphlets are published each year. The First Amendment of the Constitution protects free speech and thus, unfortunately, permits authors to publish inaccurate and misleading health information as long as it is not directly tied to the sale of products.

Writers and publishers are subject to libel laws if they unfairly demean the character of any individual. In 1992, *Vegetarian Times* published a rebuttal[47] and paid $21,000 in an out-of-court settlement to the National Council Against Health Fraud and four of its board members who charged that they had been unfairly criticized in a 1991 article about "quackbusters."[48]

FTC laws protect consumers against false and misleading advertising. Federal laws and some state food and drug laws provide protection against improper labeling of products and advertising with false or unproved health claims. However, many independent publications promote questionable products. Consumers should be alert to this situation and be aware that misinformation about food supplements is spread through many channels (see Chapter 12).

Bestseller lists often contain untrustworthy books on diet, fitness, or "alternative medicine." The *Beverly Hills Diet,* by Judy Mazel, sold over 1 million copies and was on the bestseller list for many weeks. It was a bizarre diet primarily based on eating fruit and avoiding combinations of foods that supposedly cannot be digested at the same time. *Life Extension*, by Durk Pearson and Sandy Shaw, was based on the dubious premise that animal experiments suggest that taking various nutrients can prolong human life to 150 years. The book stimulated sales of various substances it said have "anti-aging" properties. In recent years: (a) Deepak Chopra, M.D., has charmed the public by declaring that health is a conscious choice; (b) Andrew Weil, M.D., has promoted "integration" of standard and "alternative" medicine; (c) Nicholas Perricone, M.D., has promoted the simplistic idea that inflammation is the cause of aging; and (d) the Public Broadcasting System has promoted *The Perricone Prescription* and *Gary Null's Ultimate Anti-Aging Diet* for fundraising purposes. Amazon Books lists more than 1500 astrologic books written in English that are in print. Many of these involve health predictions.

Many publishers are willing to publish books on unproven theories if they think that the books will be profitable. Only a few are unwilling to do so, and fewer still are willing to criticize dubious methods. Prometheus Books specializes in dissecting quackery and paranormal claims. Harvard Medical School and Johns Hopkins Medical School both publish excellent in-depth reports on timely subjects. Chapter 9 contains suggestions for a home health library.

Videotapes and CD-ROMs. Many health organizations and commercial companies produce educational tapes and CDs. Time-Life Warner, Dartmouth Medical School, and the Mayo Clinic have produced some of the best. Many public libraries have such items available.

Radio and television. Thousands of radio and television stations provide a steady stream of health news and commentary. Many stations use physicians as commentators or consultants. Although news reports tend to be presented accurately, talk shows give frequent exposure to promoters of quackery and infomercials are almost always misleading (see Chapter 4). Talk-show guests are usually selected for their "entertainment" (audience-attracting) value rather than the soundness of their ideas. Some gain media access by hiring public relations firms to promote their media appearances. Critics of quackery are sometimes invited to debate, but are rarely permitted to appear unopposed. Stations rarely take corrective action when they receive complaints about their health programming.[49]

The quality of health information on CBS-TV's "60 Minutes" has been very inconsistent. The American Council on Science and Health used 65 experts to evaluate 97 transcripts of programs from 1978 through 1995 that addressed medical treatments or health scares. Each transcript underwent at least three reviews, during which they were assigned overall "report card" grades of A (4 points), B (3 points), C (2 points), D (1 point), or F (0 points). Fewer than 25% of the transcripts received a mean grade greater than 3.0, and more than 40% received a mean grade less than 2.0. The overall transcript grade was a "C."[50]

Heussner and Salmon[51] have noted three shortcomings of fallacious reporting: (1) many people may be led to doubt their doctors and acquire unrealistic hope in a risky procedure, (2) ensuing controversies can divert scientists' valuable time and attention or cause scarce research funds to be wasted on studies to formally disprove an obviously unworthy proposition, and (3) fallacious reporting wastes media resources that could be better used to provide useful information about health and disease issues.

Prudent Use of the Internet

The amount of health-related information accessible through computer channels is huge and expanding

rapidly. These sources can be accessed through the Internet, the largest worldwide computer network. Anyone with access to a computer, a modem, and appropriate software can explore this wealth of information. Students often can do so, free of charge, through computers at their school. Free access is also available at public libraries.

Health information is available in several electronic formats.[52] Online databases can be searched by keyword. MEDLINE, the National Library of Medicine's database of references to the medical literature, can be accessed through various commercial and noncommercial channels. It is the world's largest such database, with more than 12 million references published since 1966 and about 10,000 new ones added per week.

The World Wide Web offers "pages" of text and graphics, similar to the pages of a magazine, on millions of topics. Pages can be accessed by clicking on a "link" (hyperlink) or entering their "URL" (unique resource locator) in a Web browser window. Many Web sites offer free e-mail newsletters.

Newsgroups, bulletin boards, and "blogs" enable people to hold discussions by posting and responding to messages. "Chat groups" permit discussions with all participants typing at once. Electronic mailing lists enable designated groups to hold discussions by electronic mail (unlike newsgroups and chat groups, which are available to all comers). Online sources provide peer communication, anonymity, convenience, and rapid responses. The information is voluminous but not necessarily accurate. Virtually anyone can create an online resource and make it generally available. This includes not only health professionals but also ordinary people who believe they have been helped by a product, companies with a financial stake in the information they provide, and even outright charlatans.

Locating Information

The Internet has no central index, but the World Wide Web offers search engines that comb large portions of the Internet. The most efficient is Google (www.google.com), which can search billions of pages in about 1 second. Its advanced search page enables display of as many as 100 links at a time. The "Cached" links sometimes access pages archived on Google's servers that are no longer on the Web. For most efficient use, it is advisable to save one's preferences and add Google's advanced search page to your personal toolbar.

The Wayback Machine, located at www.archive.org, provides archived versions of many Web sites as they appeared as far back as 1996.

☑ Consumer Tip

American Telemedicine Association Advisory on the Use of Medical Web Sites (1999)

Since the use of the Internet for accessing health information and medical treatment is new, there exists little in the way of safeguards for consumers. These guidelines can help consumers who choose to use the Internet to obtain information about health care or to seek medical treatment:

1. Make sure that Web sites used to obtain information about health and medicine are provided by a reliable and credible source such as recognized and credentialed health care providers, and use sources that are based on qualified authorities. The source of the information should be clearly labeled and annotated.
2. In some cases commercial interests such as a drug manufacturer may sponsor or contribute information to a Web site. Consumers should look for assurances that the information provided in these cases is objective and does not favor the sponsor's products.
3. At this time consumers should exercise caution in using Web sites that offer online diagnosis of an individual's medical condition and prescribed treatment and medication for the diagnosed condition. There are currently no recognized accreditation or regulatory authorities overseeing the operation of these sites.
4. It is a widely recognized conflict of interest for health professionals who prescribe medicines to have any direct financial relationship with an entity that sells those medications. Therefore, consumers are cautioned against obtaining prescribed medicines from Web sites that offer both diagnosis of condition and direct sales of the prescribed medicine.
5. Consumers seeking medical treatment from health professionals over the Internet should receive clear assurances that they will be interacting with a qualified professional holding the appropriate credentials and that the professional is able to legally practice medicine in the consumer's location.
6. Clinical consultation over the Web by credentialed providers should include procedures that protect the patient including: informed consent; information security and privacy protection measures; and documentation of the clinical encounter.

MEDLINE can be searched efficiently with the National Center for Biology Information's "Clinical Queries" page at www.ncbi.nlm.nih.gov:80/entrez/query/static/clinical.html.

It is generally safer to use professionally recommended sites rather than searching blindly with a search engine. Slater and Zimmerman[53] warn:

> Listings of search results provided by the most widely used Web portals often do not provide basic information a consumer would need to select an objective and reliable health information Web site. Search descriptions of health sites ideally should permit consumers before actually accessing a Web site, to determine more consistently and accurately the source of the information and whether the site is selling products or providing information free of commercial intent. Commercial sites are of particular concern given evidence that the large majority of such sites promote unregulated supplements and unproven remedies and services and that pseudoscientific claims made by such promotional sites may be persuasive even to readers with college-level scientific training.

Even MEDLINE searches have potentially serious shortcomings. Without expert guidance, it can be difficult or impossible to judge whether individual reports are significant and how to integrate them with other relevant information.

Judging Credibility

The following questions can help evaluate the credibility of an online information source: (a) Who maintains the information? (b) Is it linked with other reputable sources of medical information? (c) When was it last updated? and (d) Is it selling a product? Larkin and Douglas[54] suggest that if you find something interesting, write it down (and the site's location) and ask your doctor about it. Quackwatch[55] recommends avoiding all sites that are marketing dietary supplements, herbs, or homeopathic products. Unsolicited commercial e-mail messages ("spam") for health-related products should also be ignored.

Many efforts are being made to develop quality standards and rating systems.[56] Two Canadian researchers examined 47 systems used to rate Web sites providing health information on the Internet and found that 14 of these described their rating criteria, only 5 provided instructions for their use, and none provided information on whether they had been validated. The researchers concluded:

> Many incompletely developed instruments to evaluate health information exist on the Internet. It is unclear, however, whether they should exist in the first place, whether they measure what they claim to measure, or whether they lead to more good than harm."[57]

Consumer Tip

Signs of a Misguided Web Site

The best way to avoid being quacked is to reject quackery's promoters. Each item listed below signifies that a Web site is not a trustworthy information source:

General Characteristics

- Any site used to market herbs or dietary supplements. Although some of these products are useful, it is impossible to sell them profitably without deception, which typically includes: (a) lack of full disclosure of relevant facts, (b) promotion or sale of products that lack a rational use, and/or (c) failure to state who should **not** use the products.
- Any site used to market or promote homeopathic products. No such products have been proven effective.
- Any site that **generally** promotes "alternative" methods. There are more than 1000 "alternative" methods. The vast majority are worthless.
- Any site that promotes "nontoxic," "natural," or "holistic" treatments.

False Statements about Nutrition

- Everyone should take vitamins.
- Vitamins are effective against stress.
- Taking vitamins makes people more energetic.
- Organic foods are safer and/or more nutritious than ordinary foods.
- Losing weight is easy.
- Special diets can cure cancer.
- Diet is the principal cause of hyperactivity.

False Statements about "Alternative" Methods

- Acupuncture is effective against a long list of diseases.
- Chelation therapy is an effective substitute for bypass surgery.
- Chiropractic treatment is effective against many diseases.
- Herbs are generally superior to prescription drugs.
- Homeopathic products are effective remedies.
- Spines should be checked and adjusted regularly by a chiropractor.

False Statements about Other Issues

- Fluoridation is dangerous.
- Immunizations are dangerous.
- Mercury-amalgam ("silver") fillings should be removed because they make people sick.
- All teeth that have had root-canal therapy should be removed because they make people sick.

Table 2-4

Recommended Web Sites

Each of these sites contains extensive practical information. However, some articles about "complementary" and "alternative" methods on the sites marked with an asterisk (*) are not sufficiently critical.

American Academy of Family Physicians
www.aafp.org/family/patient.html

American Academy of Pediatrics
www.aap.org

American Cancer Society
www.cancer.org

American Council on Science and Health
www.acsh.org

American Dietetic Association
www.eatright.org

American Heart Association
www.americanheart.org

American Medical Association
www.ama-assn.org

Consumer Health Sourcebook
www.chsourcebook.com

Federal Trade Commission
www.ftc.gov

Food and Drug Administration
www.fda.gov
Center for Food Safety & Applied Nutrition
vm.cfsan.fda.gov
Information for Consumers
www.fda.gov/opacom/morecons.html

Mayo Clinic Health Oasis*
www.mayohealth.org

Medem*
www.medem.com/

Merck Manual Home Edition*
www.merckhomeedition.com

National Cancer Institute*
www.nci.nih.gov

National Council Against Health Fraud
www.ncahf.org

National Institutes of Health*
www.nih.gov

Oncolink (cancer database)
oncolink.upenn.edu

Quackwatch
www.quackwatch.org

U.S. Preventive Services Task Force
www.ahrq.gov/clinic/uspstfix.htm

Internet Health Pilot (www.ihealthpilot.org) provides a reliable guide to additional sites.

Most of these systems excessively weighted appearance, ease of use, and other factors unrelated to information quality.[58] Reliable reviews of health-related Web sites suitable for laypersons are published regularly on MD net guide. Most guidebooks to health-related Web sites judge good sites accurately but fail to appropriately criticize bad ones.

The HONcode system encourages voluntary compliance with high standards, but it does not ensure that content is accurate. (See Consumer Health Insight box.)

Quackwatch's screening list enables rapid identification of "quacky sites" to avoid.[55] (See Consumer Tip box on page 29.) However, judging the accuracy of science-based sites requires expert knowledge. So even if a "perfect" yardstick were developed, no organization is likely to have sufficient resources to apply it to the huge number of sites available for laypersons. Table 2-4 lists the URLs of several reliable sources.

Further Suggestions for Consumers

Individuals must act intelligently to protect themselves from misleading and fraudulent practices that abound in the health marketplace.

Johnson and Goldfinger[59] provide these tips for evaluating medical or health information:

- Proof that a new treatment is effective requires controlled studies that compare treatment under discussion to other treatments or to no treatment. Controls help to remove bias, and with large enough numbers the study can be statistically valid.
- Reports should be based on studies published in peer-reviewed medical journals.
- Safety is not an absolute phenomenon but a relative one. All life activities, including medical treatment, involve some risk. The question is whether the risk is justified in comparison to other treatments and to the potential gain.
- Be wary of claims of unusual remedies for chronic or incurable diseases. The burden of proof rests with those who make the claims.

Fleiger[60] advises consumers to be skeptical of news of major drug "breakthroughs" because many such reports are exaggerated or inaccurate interpretations of scientific findings. Noting that truly significant advances in drugs and drug therapy are rare, he gives these tips:

- News stories about drugs producing complete cures, especially in patients with severe arthritis, AIDS, cancer, or other grave illnesses, are likely to be wrong. Except for antibiotics, few drugs can make a disease disappear totally and permanently.
- The results of one study of a small number of patients are seldom, if ever, conclusive. News stories may place undue

importance on these reports and jump to conclusions that the researchers themselves know are unjustified.
- Consider whether the report was made by a reporter or news service that regularly covers health and medical affairs and assigns reporters specializing in the subject. Be skeptical if the source emphasizes sensational stories regularly.
- Ask your doctor. Although physicians cannot know everything, they are likely to be aware of truly important medical advances.

To stay informed, consumers can do the following:

- Read reliable publications such as those recommended in Table 2-3. The most practical and reliable magazine is *FDA Consumer*. The best newsletters are *Consumer Reports on Health* and *Tufts University Health & Nutrition Letter*. The best publication on "alternative medicine" is the journal *Scientific Review of Alternative Medicine*.

Consumer Health Insight

Significance of the HONcode Seal

The Internet's most widely recognized standard-setting organization is the Geneva-based Health on the Net (HON) Foundation (www.hon.ch). Sites that follow its code of conduct are welcome to display the HONcode seal. The HONcode's eight principles, listed below, evolved from discussions with Webmasters and medical professionals in several countries. These principles are sound, but compliance is voluntary and some sites displaying the seal contain unreliable information or link to other sites that contain unreliable information. To legitimately use the seal, a Web site must apply for registration. If accepted, it must subsequently comply with all the principles enumerated in the HONcode. When a noncompliant site is reported, HONcode officials ask that the seal be removed—and most sites comply. More than 5000 sites display the HONcode seal. To check whether a site is actually registered, click on the seal, which should be linked to a registration status report on the HON site. The HON Foundation also reviews Web sites and posts the results. However, its reviews of sites providing unreliable information on "alternative" methods have been descriptive rather than critical—and thus offer little or no guidance to Web browsers. In addition, its search engine does not limit its searches to reliable sites. HON officials are aware of these problems and have indicated interest in correcting them. Quackwatch has identified several HONcode violators.[61]

1. **Authority**
   Any medical or health advice provided and hosted on this site will only be given by medically trained and qualified professionals unless a clear statement is made that a piece of advice offered is from a non-medically qualified individual or organization.
2. **Complementarity**
   The information provided on this site is designed to support, not replace, the relationship that exists between a patient/site visitor and his/her existing physician.
3. **Confidentiality**
   Confidentiality of data relating to individual patients and visitors to a medical/health Web site, including their identity, is respected by this Web site. The Web site owners undertake to honor or exceed the legal requirements of medical/health information privacy that apply in the country and state where the Web site and mirror sites are located.
4. **Attribution**
   Where appropriate, information contained on this site will be supported by clear references to source data and, where possible, have specific HTML links to those data. The date when a clinical page was last modified will be clearly displayed (e.g., at the bottom of the page).
5. **Justifiability**
   Any claims relating to the benefits/performance of a specific treatment, commercial product or service will be supported by appropriate, balanced evidence in the manner outlined in Principle 4.
6. **Transparency of authorship**
   The designers of this Web site will seek to provide information in the clearest possible manner and provide contact addresses for visitors that seek further information or support. The Webmaster will display his/her e-mail address clearly throughout the Web site.
7. **Transparency of sponsorship**
   Support for this Web site will be clearly identified, including the identities of commercial and non-commercial organizations that have contributed funding, services, or material for the site.
8. **Honesty in advertising & editorial policy**
   If advertising is a source of funding, it will be clearly stated. A brief description of the advertising policy adopted by the Web site owners will be displayed on the site. Advertising and other promotional material will be presented to viewers in a manner and context that facilitates differentiation between it and the original material created by the institution operating the site.

- Identify and use reliable sources of information on the Internet.
- Read *Consumer Health Digest*, a free e-mail newsletter co-sponsored by Quackwatch and the National Council Against Health Fraud, which provides news related to the topics covered in this textbook. Subscription information is at www.ncahf.org/about/chd.html.
- Select health professionals and health educators carefully.
- Obtain information from federal, state, and local government agencies and reputable professional and voluntary organizations, such as the FDA, the AMA, the American Cancer Society, the American Dental Association, the U.S. Public Health Service, and others listed in the Appendix.
- For breaking health and medical news, read such sources as *Time, Newsweek, U.S. News & World Report, The New York Times*, and *The Wall Street Journal*, but be wary of their coverage of "alternative" health methods and alleged health threats.
- Take courses at accredited schools, colleges, and universities, but do not assume that all their courses are free of misinformation.

Summary

Consumers obtain health information from nonprofessional, professional, and pseudoprofessional individuals as well as from educational institutions and the media. Unfortunately, much of this information is misleading, inaccurate, or false.

Scientific methods offer an objective way to evaluate information to determine what is false, but even scientists sometimes find it difficult to sort fact from fiction.

The intelligent health consumer should:

- Maintain a healthy degree of skepticism toward health information received through the media.
- Select practitioners with great care.
- Become well-informed before making decisions to purchase and use health products and services; pay little or no attention to health advertising.
- Seek reliable sources of information.
- Be familiar with the fundamental concepts used in the scientific method, including statistical concepts.

Consumer Tip

How to Judge an Information Source

The following questions may be helpful in determining reliable sources of information:

- What is the purpose of the book, presentation, or statement? Is it to sell products or ideas and make money? Or is it to present data or to make a professional contribution?
- What is the procedure and style of presentation? Is it presented in an educational or scientific manner? Are propaganda devices used, such as testimonials, broad generalities, name-calling, and misleading statements? Does the information contain exaggerated claims or use gross superlatives?
- What are the qualifications of the author, speaker, organization, or agency? What is the educational background, professional experience, and training of the individual? If he or she has scientific credentials, are they in the field in which the claims are made?
- What is the standing of the individual in the professional community? Is the person listed in any recognized biographic sources such as *American Men and Women of Science* or in directories of health specialists?
- Are the data based on appropriate research by experts in the health field or on the testimony or opinions of one or a few individuals? Is the information based on scientific facts or on emotional appeal?
- Has the information been published in peer-reviewed professional journals and generally accepted as valid by the scientific community?
- Where there appear to be conflicting claims about a health matter, what is the extent of the evidence supporting or refuting the claims? Has the claimant generalized from a particular incident or from broad research?

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It's Your Decision

According to a local newspaper report, a researcher at a medical center claims to have discovered a substance that shows great promise for curing severe acne. How can consumers determine whether the report is valid? What questions should be raised about the research methodology, the use or misuse of statistics, the possibility of fraud, and whether the study has been peer-reviewed? How can the reliability of this information be checked?

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