

A SCIENTIFIC LOOK AT ALTERNATIVE MEDICINE

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Overview of Complementary and Alternative Medicine (CAM)

SURVEY OF COMPLEMENTARY AND ALTERNATIVE MEDICINE

Definition and scope

Definitions of “alternative medicine”:

1. Approaches that are not generally accepted by the scientific medical establishment (relates to scientific evidence)
2. Approaches that are not reimbursed by health insurance (relates to political power and economic decisions)

Other terms: “complementary medicine” (use *along with* conventional rather than *instead of*); “complementary and alternative medicine” (CAM); “integrative (or integrated) medicine” (combine complementary with conventional)

Ernst et al. (1995) *Br. J. Gen. Pract.* 45, 506: “complementary medicine is diagnosis, treatment and/or prevention which complements mainstream medicine by contributing to a common whole, by satisfying a demand not met by orthodoxy or by diversifying the conceptual frameworks of medicine.”

The National Center for Complementary and Alternative Medicine classifies CAM into five “domains”:

1. *Alternative medical systems* (e.g., homeopathy, naturopathy, traditional Chinese medicine, Ayurveda)
2. *Mind-body interventions* (e.g., meditation, prayer, hypnosis, music therapy, biofeedback)
3. *Biologically based therapies* (herbs, dietary supplements)
4. *Manipulative and body-based methods* (chiropractic, osteopathic manipulation, massage)
5. *Energy therapies*, divided into *biofield therapies* (e.g., qi gong, reiki, therapeutic touch) and *bioelectromagnetic-based therapies* (involving unconventional use of magnetic fields)

This course will cover a broad range of topics, ranging from approaches that are being considered seriously within scientific medicine to approaches that are scientifically unlikely or discredited (and some that are fraudulent).

Eisenberg et al., *New Eng. J. Med.* 328, 246-252 (1993) reported that one-third of Americans used unconventional therapy within the last year. This may have been an overestimate, since the values included activities such as relaxation and massage. In a followup study (Eisenberg et al., *JAMA* 280, 1569-1575 (1998)) the usage had increased to 42%. Total out-of-pocket expenses were estimated to be \$27 billion per year. “A small minority of persons accounted for more than 75% of visits to CAM providers” (Wolsko et al., *Arch. Intern. Med.* 162, 281-287 (2002)). A 2004 NIH study reported usage of 36% (including prayer for health reasons increased the total to 62%). “CAM was most often used to treat back pain or back problems, head or chest colds, neck pain or neck problems, joint pain or stiffness, and anxiety or depression” (Barnes et al., *Advance Data*, No. 343 (2004)).

Druss and Rosenheck (*JAMA* 282, 651-656 (1999)) found a much lower level of usage (8.3%). Most who used unconventional methods also received conventional care, suggesting that they perceive the methods as complementary rather than alternative.

Astin et al. (*J. Gerontol.* 55A, M4-M9 (2000)) surveyed a sample of the elderly in California. 41% reported using CAM, but "Use of CAM was not associated with any observed changes in health status." Of those using, 58% did not discuss their use with their physicians.

A 2005 survey found that 64% of physicians have recommended complementary therapies to their patients.

Why should health care providers and others be concerned?

If valid: should be incorporated into medical practice

If not valid:

- might be harmful (direct harmful effects; interactions with conventional medications)
- might be used in place of needed treatments
- expense
- wasted time and energy
- raises false hopes

Educational issues - critical thinking

Why do patients seek alternative practitioners?

Desperation

Pleasant falsehoods vs. disagreeable truth. Fear of medical diagnosis.

Vanity/feeling of accomplishment - take control, decide for yourself, participate in treatment

Dissatisfaction with doctor/patient relationship: impersonal, little contact time, waiting, paperwork, tests.

Staying healthy vs. crisis intervention

Medicine too successful: desire for everything to be cured quickly

Lower costs. Pagán and Pauly (*Health Affairs* 24, 255-262 (2005)) argue that growth in CAM use may be partly due to increased costs of conventional care.

Astin (*JAMA* 279, 1548-53 (1998)) reported that users of alternative methods were not distrustful of conventional medicine. Rather, they found "health care alternatives to be more congruent with their own values, beliefs, and philosophical orientations toward health and life."

The NIH National Center for Complementary and Alternative Medicine (NCCAM)

In 1991, Congress established an *Office of Alternative Medicine* within the National Institutes of Health, with funding of several million dollars per year (which is very small compared to the total NIH budget). This provided great publicity for alternative practitioners, who claim that this shows that their practices are moving into the mainstream. However, OAM was a result of *political pressure*, not the scientific judgement of

NIH that such studies are warranted.

In 1998, the Office of Alternative Medicine was converted to the *National Center for Complementary and Alternative Medicine*, which allows it to fund grants directly. The director is Stephen Straus. The budget has risen to \$118 million, and there many research centers at various institutions around the country, as well as two international centers. Grants also have been awarded to medical schools to develop instructional programs in CAM. Critics have noted that after nine years of research supported by OAM and NCCAM, no therapy had been shown to be either effective or ineffective, and that some areas of research were implausible.

Goldrosen and Straus (*Nat. Rev. Immunol.* 4, 912-921) listed “ongoing, large phase III trials of CAM modalities” supported by NCCAM for the following: acupuncture and glucosamine/chondroitin sulfate for osteoarthritis; vitamin E for prostate cancer; shark cartilage for lung cancer; St. John’s wort for minor depression; chelation therapy for coronary artery disease; and saw palmetto for benign prostate hypertrophy.

Other recent developments

Alternative medicine is increasingly being taught in medical school courses and programs (e.g., "Integrative Medicine").

Increased availability of courses in alternative methods, giving continuing education credit for health professionals

Some health insurance plans have increased their coverage of alternative methods. A 2004 survey found that 87% of employers offered coverage for chiropractic and 47% for acupuncture. However, rising health care costs have made some insurers reluctant to offer new benefits with unknown costs.

Development of integrated health centers, in which both conventional and unconventional practitioners can be found. A survey found that 15% of community hospitals included CAM, with the number doubling between 1998 and 2000.

State legislatures are being asked to recognize alternative professions and methods.

The Internet is now a powerful medium for promoters of unconventional methods, dietary supplements, etc. Much of the available information is unreliable. The Federal Trade Commission (see below), along with the FDA and other government agencies, has been active in fighting misleading information available on web sites.

REGULATORY AGENCIES INVOLVED IN HEALTH CLAIMS

Food and Drug Administration - regulates content and labeling of foods, drugs, medical devices, and cosmetic products. We will discuss the role of the FDA in more detail in the lecture on dietary supplements.

Federal Trade Commission - regulates advertising and marketing of foods, non-prescription drugs, cosmetics, medical devices, and health care services.

Postal Inspection Service - regulates products advertised or sold through mail.

State attorneys general

State professional licensing boards

OTHER ORGANIZATIONS

Promoting alternative methods in general (specialty areas have their own organizations)

National Health Federation

American Preventive Medical Association

Committee for Freedom of Choice in Medicine

Foundations: Fetzer, Rosenthal, Templeton - support research, academic programs, conferences, etc.

Promoting critical examination of alternative claims:

National Council Against Health Fraud. Web site: www.ncahf.org.

Stephen Barrett, M.D. - Quackwatch and related web sites.

Committee for the Scientific Investigation of Claims of the Paranormal (CSICOP)

Critical Thinking in Evaluation of Medical Claims

PHILOSOPHICAL ISSUES

More than one system or approach to truth? More than one set of realities?

British Medical Association report (1986): "...orthodox medicine will not exclude a treatment because its mode of action is not understood. There is thus no logical class of 'alternative therapies': there are only therapies with and without good evidence for their efficacy."

JAMA editorial by P. Fontanarosa and G. Lundberg (280, 1618-9 (1998)): "There is no alternative medicine. There is only scientifically proven, evidence-based medicine supported by solid data or unproven medicine, for which scientific evidence is lacking. Whether a therapeutic practice is 'Eastern' or 'Western,' is unconventional or mainstream, or involves mind-body techniques or molecular genetics is largely irrelevant except for historical purposes and cultural interest."

NATURE OF SCIENCE

Based on natural law (as opposed to supernatural)

Tested against the empirical world

Falsifiability

Confirmation vs. proof

Self-correcting

Tentative

Predictive

Theories that unify

Fruitful

SCIENTIFIC ACTIVITIES AND METHODS

Controlled studies (contrast: anecdotal and case studies). In relation to medical science:
 epidemiology
 laboratory
 animal
 clinical

(It is sometimes claimed that only 10-20% of medical procedures have been shown to be effective. This is a *myth*, based on: 1) data from a few rural British physicians in 1960-1. 2) other unpublished estimates. A more recent study of hospital-based medicine arrived at a figure of 85%.)

Some other terms that arise in clinical studies:

- *odds ratio* - ratio of the odds of an event happening in the experimental group to that for the control group. If the odds are low, is similar to *relative risk*, the ratio of the risk in the experimental group to that in the control group. For both of these, values of 1 indicate no difference.
- *confidence interval* - expresses the estimated range of effects based on the data. Usually a 95% value is employed, in which case we have 95% confidence that the true value is within the stated range.
- *intention-to-treat analysis* - the data from all subjects are included for the groups to which they were assigned, even if they do not complete the study. Eliminates potential artifacts that could arise if the treatment (or lack of treatment) causes unfavorable effects that lead to dropouts.

SOME TYPES OF CLINICAL STUDIES

Retrospective studies

- International studies: compare groups in different countries
- Migrant studies: compare people who move from one country to another
- Case-control studies: compare people with disease (but otherwise similar) to people without disease

Prospective studies

- Cohort studies: start with healthy population and follow through time
- Prevention studies: give treatment to healthy population
- Intervention studies: give treatment after onset of disease
- Crossover design
- Single- and double-blind

Meta-analysis: attempts to draw conclusions by analysis of previously published studies, with critical consideration of their methodological strengths and weaknesses. The *Jadad scale* (see box) is frequently used, evaluating whether the study includes statements and adequate descriptions of: randomization (0 to 2 points), double-blinding (0 to 2 points), and treatment of dropouts and withdrawals (0 to 1 point). However, it has been pointed out that the scale may reward reporting quality rather than methodological quality. Methods for dealing with bias in meta-analyses (such as presence of asymmetry in funnel plots) have been described (Sterne et al., *BMJ* 323, 101-105 (2001)).

JADAD SCALE

Give one point for:

- Study described as randomized
- Method for randomizing described and appropriate
- Study described as double-blind
- Method of double-blinding described and appropriate
- Description of withdrawals and dropouts

Subtract one point for:

- Method for randomization described and inappropriate
- Method for double-blinding described and inappropriate

GRADES OF EVIDENCE FOR THE PURPORTED QUALITY OF STUDY DESIGN

(U.S. Preventive Services Task Force, as cited in Concato et al., *New Engl. J. Med.* 342, 1887-1892 (2000))

- I Evidence obtained from at least one properly randomized, controlled trial.
- II-1 Evidence obtained from well-designed trials without randomization.
- II-2 Evidence obtained from well-designed cohort or case-control analytic studies, preferably from more than one center or research group.
- II-3 Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled experiments (such as the results of the introduction of penicillin treatment in the 1940s) could also be regarded as this type of evidence.
- III Opinions of respected authorities, based on clinical experience; descriptive studies and case reports; or reports of expert committees.

LEVELS OF EVIDENCE

(Sackett, *Chest* 95 (Supp.), 2S-3S (1989), as cited in Laramore and Mulkerin, *Sci. Rev. Alt. Med.* 5, 165-169 (2001))

- I Randomized trials with sufficient patient numbers that there are low false-positive (α) and low false-negative (β) errors.
- II Randomized trials with high false-positive (α) and/or high false-negative (β) errors.
- III Nonrandomized, concurrent cohort comparisons between contemporaneously treated patients.
- IV Nonrandomized, historical cohort comparisons between current patient groups receiving the experimental treatment and previously treated groups treated in another manner.
- V Case studies without control groups.

Statistical validity

Confirmation by independent observers

Publication in peer-reviewed journals

Scientific community

SOME CHARACTERISTICS OF PSEUDOSCIENTIFIC HEALTH CLAIMS

Nonfalsifiable or irrefutable hypotheses

Attribute failure to reproduce results to:

- failure to perform procedures properly
- bias
- incorrect attitude

Unwilling to examine the phenomena closely with carefully controlled experiments

Reliance on anecdotal evidence, or on data from flawed studies (poor controls, insufficient sample size, etc.).
Anecdotal evidence can be very persuasive - especially if it concerns yourself.

Argument from authority rather than evidence - endorsements by doctors, panels, etc.

Selection of only supportive data, or deletion or changing of unfavorable data

Confuses correlation with causality

"Special pleading" - less stringent rules of evidence should be applied to its claims

Claim to be too busy healing patients to pursue verification through research

Lack of acceptable confirmation of diagnosis before treatment and/or proper followup to confirm healing

Subjective evaluations or measurements

Use of pseudomedical jargon: "detoxify," "rejuvenate," "energy," etc. - entities that cannot be measured

Proposes a single underlying cause for diverse diseases or conditions

Supported through myth and legend: if idea has been around so long, must contain some truth

Charge opponents with being close-minded

Charge persecution of unorthodox and revolutionary ideas: "They laughed at..."

Appeals to vanity of patients: "think for yourself"

Exaggerated or false advertising claims

Bogus credentials of practitioners (e.g., degrees from unaccredited institutions)

Use of secret formulas

Lack of continuity with other fields of knowledge. Modern scientific medicine is part of an enterprise ranging from physics to astronomy. "Alternative" practices are largely unrelated or even conflicting in their "theories."

OTHER THINGS TO BE AWARE OF IN DUBIOUS HEALTH CLAIMS

Words and phrases: amazing, breakthrough, easy, natural, America's #1 expert

Research (what quality? replicated?)

Effective for wide variety of ailments

Offers cure

Immediate results promised

Claims the cures are suppressed by medical establishment

Questionnaires (nearly everyone ends up with a recommendation for treatment or supplements)

Invalid diagnostic tests (e.g., hair analysis, applied kinesiology)

SOME COMMON THEMES IN COMPLEMENTARY AND ALTERNATIVE MEDICINE

Energy - has a vague, mystical or spiritual quality; not equivalent to any form of energy recognized by science. Some varieties: *vital force* (homeopathy), *qi* (chi) (Chinese medicine), *prana* (Ayurvedic medicine), *innate intelligence* (chiropractic). Related to the idea of *vitalism* - living things have properties that cannot be explained by their atoms and molecules.

Natural - treatment using "natural" approaches (diet, herbs, manipulations, etc.) is held to be superior to drugs (often referred to as "poisons") and surgery. Chemicals derived from natural sources are regarded as superior to their synthetic equivalents.

Self-healing - the body is believed to have great healing abilities, which can be stimulated by various approaches (provision of nutrients, meditation, homeopathic remedies, elimination of toxins, correction of subluxations, etc.).

Toxins - deleterious factors from food or the environment are held to accumulate (especially in the colon), leading to disease. Methods such as diets, herbs, or colonic irrigation are used to remove them.

Opposition to public health measures - some alternative practitioners have opposed measures such as vaccinations, fluoridation of water, and pasteurization of milk.

Reference to "allopathy" - term ("opposite" plus "suffering") invented by Hahnemann, founder of homeopathy ("same" plus "suffering"). Allopathy was used to refer to early 18th century medical practice, in which "humors" and bodily conditions were "balanced" by harsh treatments (bloodletting, purging, toxic chemicals) thought to represent "opposites." Currently used by some alternative practitioners as a derogatory term for conventional medicine, even though it is no longer a valid description of how medicine operates. (The word can also mean "a system of medical practice making use of all measures proved of value in treatment of disease" (*Webster's New Collegiate Dictionary*).)

Criticism of conventional medicine - it is common for CAM advocates to cite statistics on deaths due to side effects of drugs or to medical errors. These criticisms fail to account for the fact that some risks are necessary in treating serious medical conditions (for which people usually do not choose CAM); some deaths are due to human error in application of appropriate methods; and that some patient deaths may have occurred anyway due to their serious conditions. In contrast, adverse effects of alternative treatments are generally not tracked, and their risks (even if minor) are not justified for treatments that confer no benefits.

SKEPTICISM AND OPEN-MINDEDNESS

Dangers of being too gullible vs. too skeptical

- type I error - accepting a falsehood
- type II error - rejecting a truth

(A *power calculation* can help in the design of a study such that it is likely to reveal significant effects if they are present.)

Prejudice vs. postjudice: rejection of evidence after consideration is not close-mindedness

Open mind vs. empty mind

Lack of mechanism vs. test of evidence

OTHER GENERAL POINTS

Extraordinary claims demand extraordinary evidence. We are entitled to ask for very strong evidence before we accept ideas that are contradicted by a large amount of prior evidence.

Trained scientists can adopt pseudoscientific methods

Truth need not lie between extremes

Burden of proof; financial burden of testing. Stalker (*Mt. Sinai J. Med.* 62, 132-143 (1995)) has pointed out that in the competition for limited research funds, we should consider the *prior probability* that a hypothesis is true, compared to competing hypotheses. Many proposed alternative methods can be given low prior probabilities based on their inconsistency with scientific knowledge or other flaws. Also, since it is possible to find positive cases for virtually any treatment (whether or not it is valid), we cannot assign a high prior probability simply because a practitioner can submit a few "best cases."

Absence of disproof is not evidence in favor.

GLOSSARY OF COMPLEMENTARY AND ALTERNATIVE MEDICAL CLAIMS AND PRACTICES

Acupressure: similar to acupuncture, except that finger pressure is used rather than needles. *Shiatsu* is a Japanese form.

Acupuncture: method from traditional Chinese medicine, in which needles are inserted at specific points in order to relieve pain and treat disease. The "theory" behind acupuncture involves balancing of the body's "life force" (*qi*) as it flows through channels ("meridians"). Used in pain control, nausea, addiction, other conditions. See also Auriculotherapy; Acupressure.

AIDS remedies: many treatments previously proposed for cancer and other diseases (as well as some new ones) are claimed to be useful in treating AIDS.

Allergy treatments: abuses in this area include invalid methods of diagnosis and treatment, especially of nonexistent food allergies. See also Applied kinesiology; Clinical ecology.

Antioxidants: certain vitamins and other chemicals are thought to protect the body from free radical damage leading to disease. Under investigation within the scientific community, with more exaggerated claims made by promoters of dietary supplements. See also Orthomolecular therapy; Vitamins.

Antineoplastons: cancer treatment invented by Stanislaw Burzynski, using substances originally extracted from urine.

Applied kinesiology: invalid diagnostic method in which muscle strength is tested while substances are placed in contact with subject's body (such as under the tongue). Used to prescribe nutritional supplements, or to detect allergies or other disorders.

Aromatherapy: use of plant oils (either massaged into the skin or inhaled) to enhance mental state or treat disease.

Arthritis treatments: questionable methods include vitamins, vibrators, special diets, chiropractic, acupuncture, alfalfa tablets, copper bracelets, DMSO, honey/vinegar mixtures, and cod liver or fish oil. Glucosamine (often combined with chondroitin sulfate) is currently popular but supportive evidence is not yet convincing.

Auriculotherapy: similar to acupuncture, except that various portions of the body are represented by acupuncture points in the ear.

Ayurvedic medicine: traditional medicine of India. Includes diet, herbs, massages, and other therapies. Has some elements of Hindu theology. Leading U.S. promoter is Deepak Chopra.

Bach Flower Remedies: set of highly-diluted plant preparations invented by Edward Bach; used for psychological conditions.

Biofeedback: patients learn to control normally involuntary physiological processes by watching monitors which display measurements of skin temperature or electrical properties. Said to allow improved circulation to the extremities. Also used for stress, pain, asthma, epilepsy, attention-deficit disorder, and other conditions.

Bodywork: various treatments to manipulate the body and correct its "energy" fields and flows.

Botanicals: see Herbs.

Cancer therapies: patients battling cancer may turn to alternative therapies. A number of clinics employing unorthodox treatments are located just across the border in Mexico, near Tijuana. See also Antineoplastons; Cell therapy; Clark, Hulda; Colonic irrigation; Gerson therapy; Hyperoxygenation therapy; Laetrile; Metabolic therapy; and Shark cartilage.

Candidiasis hypersensitivity (yeast syndrome): presence of the normally harmless yeast *Candida albicans* is alleged to be responsible (at least in part) for a wide variety of ailments, ranging from fatigue and irritability to arthritis, AIDS, and multiple sclerosis. Special diets, supplements, and anti-fungal drugs are recommended by alternative practitioners.

Cell therapy (live cell therapy, fresh cell therapy): injection of cells (e.g., fetal lamb cells) to "rejuvenate" the body.

Chelation therapy: chemicals such as ethylenediamine tetraacetic acid (EDTA), which bind calcium and other metals, are injected into the blood stream. Said to reverse atherosclerosis and to treat illness due to "free radical pathology." Used for heart disease and many other conditions.

Chiropractic: a method of treatment based on the premise that misalignments of the spine ("subluxations") produce a variety of ailments, which can be treated by spinal manipulations. The most popular of alternative practices, with about 60,000 chiropractors in the United States. They are nearly fully integrated into the health care system, being licensed in all states and covered by most health insurance plans. Most frequently consulted for back problems, but many chiropractors claim to be able to treat or prevent other medical problems, and wish to be considered as primary care providers.

Clark, Hulda: claims that cancer and other diseases are caused by parasites. These can be diagnosed and treated with electronic devices (Synchrometer and Zapper, respectively).

Clinical ecology: practice that diagnoses allergies to multiple chemicals or factors in patient's environment ("environmental illness," "multiple chemical sensitivity"). Most patients may have psychiatric problems.

Coffee enemas: see Colonic irrigation.

Colonic irrigation: a treatment to remove "toxins" alleged to produce health problems. Large amounts of water are pumped into the colon. Sometimes other substances (such as coffee) are added. Employed in some alternative cancer therapies.

Crystal healing: "energy" produced by crystals allegedly causes healing, relieves stress, tunes body's "vibrations," etc.

Dietary supplements: edible substances that allegedly provide health benefits, but which are not regulated as strictly as drugs. Examples include vitamins in large doses (megadoses), herbs, antioxidants, minerals, and many biochemicals and other natural products. See also Antioxidants; Functional foods; "Glandulars"; Herbs; Natural foods; Nutraceuticals; Organic foods; and Vitamins.

Diets: many are based on dubious claims concerning nutrition and metabolism, and some may be harmful. Currently, low carbohydrate diets (e.g., Atkins) are popular, with some supporting evidence, but long-term effectiveness unknown.

Energy medicine: a collection of therapies that supposedly manipulate some type of "life energy," unknown to science, for health benefits. Sometimes the alleged energy is referred to as "subtle energy," and may be thought to project beyond the body ("human energy field"). See also Bodywork; Qi gong; Reiki; Therapeutic touch.

Folk medicine: traditional healing methods which originated before or outside of modern medicine. Because of the diverse ethnic background of the United States, folk medicine in this country includes a wide variety of treatments. See also Acupuncture; Ayurvedic medicine; Herbs; Qi Gong; Tai chi; Traditional Chinese medicine.

Functional foods: foods enriched in one or more allegedly beneficial compounds.

Gerson therapy: unorthodox cancer therapy developed by Max Gerson in the 1940's. Method emphasizes detoxification through special diets and coffee enemas. See also Colonic Irrigation; Metabolic Therapy.

"Glandulars": diet supplements consisting of animal gland or organ tissue. The rationale is that eating this material can strengthen the corresponding human organ.

Hair analysis: diagnostic method in which hair is analyzed for nutritional deficiencies or presence of toxic metals.

Healing touch: see Therapeutic touch.

Herbs (botanicals): plant substances taken for health benefits, but not normally considered as food. Proponents sometimes claim that their natural ingredients are better than synthetic counterparts, and that the complex mixtures give fewer side effects than purified components. Increasing research interest in recent years, with many herbal remedies subjected to controlled clinical trials.

Holistic medicine: by definition, an approach which considers the whole person (including psychological and emotional needs, family situation, etc.) in planning treatment. As such, this is a proper part of conventional medical treatment. In practice, the term is used by many alternative practitioners to include unconventional methods of diagnosis and treatment.

Homeopathy: employs extremely dilute solutions of agents supposedly causing symptoms similar to disease, in order to provoke the body's natural defense mechanisms. In practice the dilutions are so high as to contain few or no molecules of the original compounds. Developed by Hahnemann around 1800; became an important part of American health care in the late 1800's before declining. Has become more popular in recent years with growing interest in "natural" treatments.

Hyperoxygenation therapy: treatment of cancer, AIDS, or other conditions using ozone, oxygen, or other oxidizing chemicals (e.g., germanium). Based on premise that cancer cells are poisoned by oxidants.

Hypnosis: patient is placed in a state of relaxation and enhanced suggestibility. Used to treat addictive and other behavioral problems, recover lost memories, etc. See also Past-life therapy.

Hypoglycemia: low blood glucose. Misdiagnosed by some alternative practitioners, who blame it for a variety of ailments and treat it with dubious remedies.

Iridology: an invalid diagnostic method in which examination of the retina is used to identify conditions of various organs.

Laetrile: trade name for amygdalin, a chemical derived from apricot pits. Sometimes referred to as "vitamin B₁₇." Used in alternative cancer treatments. See also Metabolic therapy.

Live cell analysis: invalid diagnostic method in which a blood sample is analyzed by dark-field microscopy (often projected on a screen), and the appearance of the cells used to assess health.

Magnets: applied at various parts of the body, usually for control of pain. However, are too weak to bring about any physiological effects.

Melatonin: a hormone used to aid sleep, but also heavily promoted for a variety of other conditions.

Mental health: unconventional methods include supplements for autism; Eye Movement Desensitization and Reprocessing (EMDR); facilitated communication; Neural Organization Technique; Neuro Emotional Technique (NET); Neurolinguistic programming; patterning; and Thought Field Therapy.

Metabolic therapy: treatment consisting of such components as vitamins, Laetrile, other dietary supplements, and coffee enemas. Rationale is to eliminate "toxins" and enhance body's ability to heal itself. Frequently used in alternative cancer therapies.

Mercury amalgam poisoning: chewing has been alleged to release toxic doses of mercury from mercury-amalgam dental fillings. Anti-amalgamists advocate removal of all such fillings and replacement with composite resin fillings. Some use mercury-vapor analyzers to convince patients that their fillings are releasing toxic quantities of mercury.

Mind-body medicine: field dealing with the influence of mental states on the course of a disease, or susceptibility to disease. While some claims may be exaggerated, the concepts are supported by various scientific studies, and are being applied in some mainstream medical centers. See also Psychoneuroimmunology.

Multilevel marketing: method used by many distributors of dietary supplements and other products. Individuals are recruited to market the products to friends and neighbors; they can share more of the profit by recruiting additional people to work under them.

Natural foods: foods lacking preservatives or other additives, and having minimal processing. See also "Organic" foods.

Naturopathy: treatment based on the idea that disease results from the body attempting to purify itself, and can be counteracted through "natural" treatments such as special diets, food supplements, manipulations, etc. May include acupuncture, colonic irrigation, and homeopathy. Some states grant licenses to naturopaths.

"New Age" approaches: variety of techniques related to supposed ancient esoteric wisdom, higher states of consciousness, etc. See also Crystal therapy; Energy medicine; Reiki.

Nutraceuticals: dietary supplements delivering compounds in concentrated form.

"Organic" food: food grown without the use of artificial fertilizers or pesticides. See also Natural foods.

Orthomolecular therapy: use of megadoses of vitamins, and other normal body constituents, in treatment. Term invented by Linus Pauling.

Osteopathy: a system which emphasizes the relationship of the muscles and skeletal system to organ function. It employs manipulation as well as other treatments. In contrast to chiropractic, it has adopted many concepts and practices of conventional medicine. Doctors of osteopathy receive training similar to doctors of medicine; are licensed in all states; and have the same rights and responsibilities as M.D.'s in nearly all states.

Past-life therapy: patients are regressed under hypnosis to "remember" events in past lives; these are thought to underlie psychological disorders.

Psychic surgery: method in which the practitioner purports to create an incision with his fingers, remove a tumor or other body part, and close the wound (leaving no scar). Has been exposed as sleight-of-hand trickery. Usually includes appeals to the religious faith of the "patient." While some practice in the United States, the most popular are in foreign countries; many Americans have traveled to the Philippines for such treatments.

Psychoneuroimmunology: the study of relationships between the brain and the immune system. Part of mind-body medicine.

Qi Gong: part of traditional Chinese medicine. Internal Qi Gong involves deep breathing exercises for health and relaxation. In External Qi Gong, a "master" performs exercises around the subject without making any physical contact, allegedly balancing vital energy (*qi*) to cure or prevent disease.

Reflexology: manipulations of the feet (or hands) to relieve pain or treat disease. Specific portions of the feet are claimed to correspond to different portions of the body.

Reiki: a technique with Asian roots, in which a practitioner uses hand motions to balance the body's "aura."

Shark cartilage: marketed as an anti-cancer therapy, based on content of a factor inhibitory to angiogenesis.

Shiatsu: see Acupressure.

Spot reduction: approaches to remove fat from specific portions of the body through creams, vibrators, exercises, etc.

Tai chi: system of exercises involving slow, gentle movements.

Therapeutic touch: treatment of illness by using the hands to adjust the "energy state" of the patient; allegedly can occur without any physical contact. Promoted among nurses. Also referred to as *Healing touch*.

Traditional Chinese medicine: a complex system of diagnosis and treatment based on prescientific understandings of human body. Attempts to maintain wellness by balancing *yin* and *yang* forces and the distribution of *qi* energy in the body. See also Acupuncture; Qi gong; Tai chi.

Vitamins: marketers of dietary supplements promote consumption of large doses of vitamins, but such doses often are regarded as unnecessary or even harmful by the medical community. However, recent research suggests that for some vitamins, levels much higher than the RDAs may be of value. Products not recognized as vitamins (e.g., "vitamin B₁₅") have also been marketed. See also Antioxidants; Orthomolecular therapy.