

## Facts and ideas from anywhere



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### CHINESE MEDICINE

In China, health care is like veterinary medicine—cash up front or no treatment (1). Health care, of course, is an issue vexing the world's most developed countries, including the USA, where people without insurance can lose all their savings if they get seriously ill. But, in worst-case scenarios, people who need urgent care generally receive it. Medicaid, of course, and Medicare

help out. That's not the case in China, where patients are routinely denied care if they cannot come up with the money to pay for it in advance—even in emergencies. The World Health Organization has ranked China fourth from the bottom of 191 countries in terms of the fairness of its medical coverage in a survey issued in 2000. In March 2005, a report from a Chinese cabinet think tank said that unless China overhauls its medical care, "it will directly affect economic development, social stability, and public support for reform." The crisis in China's health care system is already showing signs of holding the country back. Health care costs are one of the main reasons Chinese save as much as 40% of their incomes. Fewer than one third of China's 1.3 billion people have health insurance. More than half of all health spending in China is out-of-pocket.

As recently as the 1970s, China's health care network covered just about everybody. Collective farms offered basic treatment and immunization. In cities, health care was a perk of jobs in the government and state factories, which often ran their own clinics and hospitals. But, as China embraced free markets, the "people's communes" were disbanded in the countryside, and thousands of state factories were shut down or privatized. Starting in the 1980s hospitals were ordered to turn a profit.

Today, China has plenty of large hospitals packed with state-of-the-art equipment to compete for paying patients. To maximize revenue, hospital doctors routinely overprescribe drugs and diagnostic procedures. Hospitals sell many drugs directly to patients and add a profit margin. Drugs account for more than 50% of all health spending in China. (In the USA, in contrast, prescription drugs account for <15% of total health spending.) The World Bank has estimated that 12% to 37%

of national health expenditures in China are wasted because of unnecessary drug prescriptions.

The strain of health care costs in China is so severe that it is plunging growing numbers of people back into the poverty from which they have so recently escaped. Medical horror stories have become a staple of Chinese state newspapers and investigative television shows.

Rural areas lag far behind cities in medical care (2). Although China's economic reforms have turned an almost uniformly poor nation into an increasingly prosperous one in the space of a single generation, the collapse of socialized medicine and staggering cost increases have opened a huge gap between health care in the cities and in the rural areas, where the former system of free clinics has disintegrated. In rural areas, 30% of children who die do so at home because their families cannot afford hospital care. According to hospital regulations, once patients owe >\$250, the doctor must issue a warning and take responsibility for getting the money. Usually patients pay in cash. Credit cards are not widely used in China.

In the last several years, China has experimented with reforms aimed at improving health care for peasants. The most important is an insurance plan in which participating farmers must make an annual payment of as little as a dollar to gain eligibility for basic medical treatments. Many peasants have complained that even the dollar payment is too big a burden and that, in any event, the coverage the plan theoretically provides is inadequate. In less than a generation the rural population that once enjoyed universal, if rudimentary, coverage is now 80% uninsured. The near-total absence of adequate health care in much of the countryside has sown deep resentment among the peasantry while helping to spread infectious diseases like hepatitis and tuberculosis and making the country—and the world—more vulnerable to epidemics like severe acute respiratory syndrome and possibly bird flu. The failure of the government to provide decent health care for peasants has reinforced the idea of China as 2 separate nations: one urban and increasingly comfortable, the other rural and increasingly miserable. Every year hundreds of millions of rural Chinese face the challenge between health and poverty, knowing that if they treat their illnesses they will lack the money needed for marriage, education, and, sometimes, food.

That China is in this situation today is as remarkable as the country's economic takeoff and, paradoxically, is inseparably related to it. Until the beginning of the reform period in the early 1980s, China's socialized medical system, with "barefoot doctors" at its core, worked public health wonders. From 1952 to 1982, infant mortality fell from 200 to 34 per 1000 live births, and life expectancy increased from about 35 to 68 years. Since then, in one of the great policy reversals of modern times, China has dissolved its rural communes, privatized vast swaths of the economy, and shifted public health resources away from rural areas and toward the cities. Public hospitals were urged to charge commercial rates for new drugs and most procedures, and today the salaries of health care workers are typically linked to the amount of income they generate for their hospitals. More than half of urban residents, by comparison, enjoy some kind of coverage, which is supplied by their employers. The recent emphasis on profit, meanwhile, has led physicians and other well-trained health care workers to abandon the countryside with a result that peasants are left at the mercy of unqualified caregivers and outright charlatans who peddle expensive, improperly prescribed drugs and counterfeit medicines.

Unable to afford proper care, the first recourse of most peasants when they fall ill is to take whatever drugs they can find on the market to relieve their symptoms and hope that their ailment goes away. Often, of course, they merely get worse or, if their illness is communicable, spread it to others. Once a peasant's illness becomes debilitating, his relatives can face a double catastrophe: the serious decline of a breadwinner and medical bills steep enough to bankrupt the family.

If one is sick, it is best to live in the USA.

## AFGHAN MEDICINE

A US doctor who had earned her medical degree at Kabul University returned there after a 14-year absence and found it decimated (3). There were no training materials, no equipment, and few books. The chairs and ceilings were gone, and the electrical wiring had been pulled out of the walls. The human models in the anatomy lab had their heads removed because Taliban law banned human figures that could be constructed as idols. The destruction of the school is emblematic of the devastation that has afflicted Afghanistan's entire medical training and health systems during the last 25 years of conflict, which has left the country with thousands of unqualified, uncertified, underpaid health workers; a dearth of clean, reliable health care facilities; adulterated drugs sold from unlicensed pharmacies; and some of the worst health indicators in the world. Afghanistan has an infant mortality rate of 115 per 1000 live births; a mortality rate for children under 5 years of 257 per 1000 live births; and a maternal mortality rate of about 2000 per 100,000 live births, including, in one region, the highest maternal mortality rate ever recorded—6500 per 100,000. Life expectancy is 43 years.

Since its 2001 invasion, the USA and other countries, including Japan, the United Kingdom, and Germany, have invested billions of dollars in Afghanistan's reconstruction, including its health system. The health ministry there has issued an urgent call to expatriate doctors to come back to help

provide essential health care. The response, however, has been less than enthusiastic. Currently scant housing is available, with no organized efforts to pay physicians' expenses. Those who have returned say they even had to fork out money for pharmaceuticals and medical supplies to treat Afghan patients. Another concern is the relationship between returning Afghan professionals and those who stayed. Those who remained in the country appear to resent the westernized professionals.

Retraining existing health professionals to higher standards is also a top priority. A recertification program that will require physicians to pass exams to practice has been instituted. Medical equipment, training facilities, and instructors, however, remain in short supply. The country has a high illiteracy rate, reported to be 86% for women. Afghan women refuse to see male physicians, so the minister of health there is trying to increase the number of women in the health workforce by 50% in the next 3 years. Much of the training is being funded by the US Agency for International Development. Despite tremendous effort and billions of dollars, reconstruction of Afghanistan's health system is not progressing as planned. Problems with reconstruction have led the USA to scale back on the number of facilities it will build in Afghanistan, a situation that could lead to resentment.

## HEALTH-CONSCIOUS MAYOR

In 2003 Mayor Bloomberg won his crusade to outlaw smoking in bars and restaurants in New York City (4). At the same time the city began handing out free nicotine patches. Health officials say that as a consequence the number of smokers in New York City has fallen by nearly 200,000. Also in 2003, Mayor Bloomberg pushed for a revamp of school menus; by the start of the school year in 2004, fat-laden meals were being replaced by healthier versions. In the summer of 2005, New York City's health department launched a campaign against *trans* fats, often used by restaurants and in packaged foods. After restaurant inspectors found that 30% of the city's 30,000 eateries were using oils that contained *trans* fats, the department began urging a citywide "oil change." Officials sent letters to food service operators and started teaching workers about *trans* fat along with their required food safety training.

Officials next want to tackle portion sizes. Towering pastрами sandwiches, bagels with gooey schmears of cream cheese, and pizza slices that spill over paper plates may be the city's culinary landmarks, but the health department is against them. Health officials are trying to teach restaurants how to make healthier meals. Mayor Bloomberg, who runs on a treadmill about an hour a day and has attained an ideal body weight, is intent on getting overweight New Yorkers to lose some pounds. In January 2006, the health department launched a drive to improve what's on the shelves of local bodegas. The corner stores are often the chief source for groceries in many poor neighborhoods, and often they do not stock healthy staples like low-fat milk, fruits, and vegetables. The pilot program will push the sale of 1% milk at a handful of bodegas in Harlem, the south Bronx, and Brooklyn.

Good for Mayor Bloomberg. Our president needs to do the same thing.

## HEALTH-CONSCIOUS GOVERNOR

In 2003, Mike Huckabee, the governor of Arkansas, learned he had type 2 diabetes mellitus (5). His physician told him he would probably be dead in 10 years, and that frightened him enough to start exercising, eschew sugar, and lose 110 pounds. He now stands 71 inches in height and weighs 180 pounds. His first attempts at jogging left him dizzy after a few hundred yards, but now he is running marathons. Mr. Huckabee has become a health care policy wonk and has begun a series of clever initiatives to fight obesity. They are among the most creative steps under way in the USA. Arkansas has become a national laboratory for using policy levers to encourage healthier lifestyles, like curbing soft drinks in schools, informing all parents of their children's body mass index as a step to encourage fitness, giving exercise breaks as well as smoking breaks, paying for preventive health checks like mammograms and prostate examinations, and seeking to give food stamps more purchasing power when they are used to buy fruits or vegetables.

Mr. Huckabee, the current chairman of the National Governors Association, is doing more to safeguard the lives of his constituents than any governor in the country. His argument is that obesity is reducing not only the quality of life of Americans but also the physical soundness of our government and the competitiveness of our businesses. The Medicaid budget is increasing about 10% annually, as is state employees' health plan costs in Arkansas. In 2006 General Motors will spend more on health care for employees and pensioners than on steel. Starbucks will spend more on health care than on coffee beans, says Mr. Huckabee. Since the governor has shaped up, his type 2 diabetes has disappeared. We need more governors like Mike Huckabee.

## TREATMENT OF DIABETES MELLITUS BEFORE INSULIN

Madeb and colleagues (6) from the University of Rochester School of Medicine described the first use of insulin in a patient in the USA. The patient was James (Jim) Havens, who was diagnosed with diabetes mellitus at age 15 in 1915. The only useful treatment at that time was an extremely low calorie diet devoid of any glucose. Each patient had to count calories, weigh food, and sometimes fast. Although seemingly cruel, this method prevented rapid death from diabetic ketoacidosis, allowing patients with diabetes to live many years before they generally died of starvation.

Jim's diabetes gradually worsened until May 22, 1922, when he became the first patient with diabetes in the USA to receive the newly purified insulin developed by Dr. Frederick G. Banting, a surgeon-turned-physiologist at the University of Toronto. During the 7 years preceding his first injection of insulin, Jim Havens gradually decreased his total caloric intake from 1900 to 800 calories daily. By spring 1922, Jim had lost all tolerance for food. His father, James S. Havens, an executive and friend of George Eastman, the president and founder of the Eastman Kodak Company in Rochester, had learned of Dr. Banting's work in Toronto through his connections. On January 23, 1922, one of Dr. Banting's patients, Leonard Thompson, had received insulin after a failed initial attempt. The success was

announced at the American Association of Physiology meeting on May 3, 1922, and shortly thereafter Havens arranged to have the insulin shipped from Toronto to Rochester.

Unfortunately, the administration by Jim's doctor, John Ralston Williams, failed to lower Jim's blood sugar, which remained >400 mg/dL. As a consequence of this failure, Dr. Banting traveled to Rochester to personally administer the insulin. Jim's morning blood and urinary sugar levels were 400 mg/dL and 21 mg/dL, respectively. After Dr. Banting administered initially 2 mL of insulin, both levels decreased, and with another 4 mL of insulin the serum glucose level decreased to 200 mg/dL and the urinary glucose level fell to 0. Dr. Banting indicated that the initial amount of insulin given was simply inadequate.

Before Jim Havens' receipt of insulin, his body weight had fallen to 74 pounds (he was 68 inches tall). Over the next 7 months, his weight increased by 20 pounds, and by April 1923 he weighed 110 pounds and was a picture of health. Jim Havens returned to his studies at the Mechanics Institute, now the Rochester Institute of Technology, and went on to marry, father 2 children, and have a very successful career as an artist. He became an acknowledged 20th-century master of the woodcut, and his works have been shown in most of the major museums in the USA. At age 60, colonic cancer was diagnosed, and he died from complications of that disease in November 1960.

## REVISED HEART FAILURE MANAGEMENT GUIDELINES

New heart failure (HF) guidelines from the American College of Cardiology and the American Heart Association were published in the September 13, 2005, issue of *Circulation* (7). Essentially, they can be summarized as follows:

1. HF was redefined as a complex clinical syndrome that can result from any structural or functional cardiac disorder that impairs the ability of the cardiac ventricle to fill with or eject blood. HF is characterized by specific symptoms (dyspnea and fatigue) and signs (edema, rales). There is no single diagnostic test for HF because it is largely a clinical diagnosis.
2. The history should include symptoms relating to sleep-disordered breathing.
3. Measurement of B-type natriuretic peptide can be useful in evaluating patients presenting in the urgent-care setting in whom the clinical diagnosis of HF is uncertain.
4. Beta-blockers—using one of the 3 proven ones to reduce mortality, i.e., bisoprolol, carvedilol, and sustained-released metoprolol succinate—are recommended for all stable patients with current or prior symptoms of HF and reduced left ventricular ejection fraction (LVEF), unless contraindicated.
5. Beta-blockers and angiotension-converting enzyme inhibitors should be used in all patients with a recent or remote myocardial infarction regardless of ejection fraction or presence of HF.
6. The addition of an aldosterone antagonist is reasonable in select patients with severe to moderately severe symptoms of HF and reduced LVEF but should be used only in patients

- with appropriately low serum creatinine and potassium levels.
7. The addition of isosorbide dinitrate/hydralazine to standard HF medications is reasonable and can be effective in blacks who are in functional class III or IV HF.
  8. Primary-prevention implantable cardioverter-defibrillator therapy on top of optimal medications
    - (a) is recommended for patients with nonischemic cardiomyopathy or those with coronary heart disease who are  $\geq 40$  days post-myocardial infarction, have an LVEF  $\leq 30\%$ , and are in functional class II or III;
    - (b) is reasonable for patients who have any HF etiology, have an LVEF of 30% to 35%, and are in functional class II or III;
    - (c) "might be considered" for patients with nonischemic cardiomyopathy and an LVEF  $\leq 30\%$  who are in functional class I.
  9. Unless contraindicated, cardiac resynchronization therapy should be used in patients in sinus rhythm who have cardiac dyssynchrony, have an LVEF  $\leq 35\%$ , and are in functional class III or IV.
  10. Consideration of left ventricular device destination therapy is reasonable in highly selected patients with refractory end-stage HF and a  $>50\%$  estimated 1-year mortality rate on medical therapy.

#### AKIRA ENDO, PHD, AND THE DISCOVERY OF STATINS

In my view, statins are the finest cardiovascular drug ever discovered or created. Peter Landers tells how they came about from Dr. Akira Endo's 1973 discovery (8). Dr. Endo, now 72 years old, was born on a farm in northern Japan. His grandfather taught him about the fungi where he grew up. He was fascinated by one poisonous mushroom that killed flies but not people, marveling how a natural substance could have such an effect. Dr. Endo came of age when several miracle drugs were discovered in natural products. Penicillin, a chemical produced by mold to kill bacteria, was discovered accidentally by Alexander Fleming in 1928. Fleming had let lab plates containing bacteria sit during a vacation. Upon his return, he discovered that mold had grown in one plate, and the mold had a bacteria-free area around it. It was not until World War II that penicillin could be mass produced. After the war, streptomycin was developed at Rutgers University by scientists who systematically examined microorganisms in soil.

Dr. Endo joined the Tokyo-based pharmaceutical company Sankyo after college, researching food ingredients. He searched through 250 kinds of fungi to find one that produced an enzyme to make fruit juice less pulpy. The product was a hit. In 1966 the company let Dr. Endo go to Albert Einstein College of Medicine in New York to pursue his interest in cholesterol research. Anticholesterol drugs, such as clofibrate, existed, but they had problematic side effects. Several companies had recognized at that time that blocking a crucial enzyme in the body's production of cholesterol, called 3-hydroxy-3-methylglutaryl-coenzyme A (HMG-CoA) reductase, could be the key to a better drug. But, they could not find a substance with this mechanism

that worked in living animals. Dr. Endo, with his unusual background, searched for something in fungi that would block the enzyme. He knew the penicillin and streptomycin stories well and in college had devoured a Japanese translation of a Fleming biography. Dr. Endo knew that bacteria, like humans, needed cholesterol to keep their cell walls together. He reasoned that some fungus probably had evolved a substance that would knock out the enzyme as a way of depriving enemy bacteria of cholesterol and killing them.

It was a matter of finding the right fungus. Dr. Endo persuaded Sankyo to get him help. In April 1971, Masao Kuroda, a chemist who had just joined the company, and 2 lab assistants began brewing fungal broths and testing each for its ability to block the enzyme, a supply of which they got from pulverized rat livers. For  $>2$  years, Dr. Endo and his team worked into the night at their lab next to a train depot in southern Tokyo. Some chemicals blocked the enzyme well but were rejected because they were toxic. After testing 6000 fungal broths they found the right one in August 1973. A substance made from a mold called *Penicillium citrinum*, similar to the mold that grows on old oranges, produced a potent inhibitor of the enzyme that helps the body make cholesterol. It was the first statin.

Almost immediately Dr. Endo ran into a problem: the substance, soon to be dubbed *Compactin*, barely worked in rats. Later research revealed that rats differ in how they make cholesterol, but Dr. Endo was stymied until he happened to meet a colleague at a watering hole near the lab one night. The colleague offered some hens for testing, saying they were about to be destroyed. The substance worked in hens.

Dr. Endo's scientific successes were followed by dissension among his colleagues. Sankyo's brass was unenthusiastic about his discovery because there was no precedent for it. They preferred to develop refinements of then-existing cholesterol drugs. With the support of only his boss at the research lab, Dr. Endo embarked on a secret experiment at Osaka University. A physician at the University Hospital named Akira Yamamoto was treating patients who had extremely high cholesterol because of genetic defects. He prepared samples of the drug and carried them to Osaka. (Permission to do human experiments from a review board or the equivalent of our Food and Drug Administration [FDA] was not necessary at that time.)

The first patient in the world to receive a statin, an 18-year-old woman, was also the first to suffer a side effect that occasionally occurs with statins: muscle pain. Because Dr. Yamamoto had given her an extremely high dose, she became so weak she was unable to walk. Dr. Yamamoto says his boss at the university advised him to halt the test. Dr. Yamamoto, however, insisted on carrying on. He discontinued the drug on the first patient and she recovered. He tried Compactin on other patients in lower doses. It succeeded in lowering cholesterol in 9 patients by an average of 27%, according to a manuscript he later published. The first patient later was treated with other statins, had a daughter, and is still living today in Japan.

When Sankyo saw Dr. Yamamoto's results, it agreed to put Dr. Endo's drug in formal clinical testing. Dr. Endo figured he

had brought it as far as he could and decided to quit Sankyo for a professor's post at Tokyo Noko University. It was not a friendly parting. Dr. Endo still complains that the company ordered the scientists in his lab not to help him carry his boxes of papers to the moving truck.

Sankyo was not the only company working on statins because it had inadvertently helped a competitor, Merck. In a 1-page 1976 agreement, Sankyo granted Merck access to its data and methods connected with Dr. Endo's statin. The agreement left a gaping hole for Sankyo: Merck didn't owe Sankyo anything. It had found the same anticholesterol properties in another fungal byproduct. In 1978 Merck discovered in a different fungus a substance that was virtually identical to Dr. Endo's, this one called *lovastatin*. Dr. Endo says he also discovered this substance independently, during his first months at Tokyo Noko University, but Merck held the rights in the USA and in 1987 began marketing it in the USA as Mevacor, the first FDA-approved statin.

Sankyo eventually gave up on Compactin and pursued studies on another statin with a similar chemical structure, which was licensed outside of Japan to Bristol-Myers Squibb Company. The product, of course, was *Pravachol*, which began to be sold in the USA in 1991. The rest is history. Today's statin drugs are the best-selling drugs in the world. They bring \$25 billion a year to the pharmaceutical companies.

Even as the drugs became famous, Dr. Endo's anonymity remained. A lengthy company history on Sankyo's website describes the discovery of Compactin but never mentions Dr. Endo by name. Drs. Michael S. Brown and Joseph Goldstein, who won the Nobel Prize for their work in cholesterol, have rightfully praised Dr. Endo for his discovery.

Dr. Endo never earned a cent for his statin discovery. When he left Sankyo in December 1978, he was making <\$2000 a month at the exchange rates at the time. Later, at his university he discovered more fungal byproducts, this time for use in chewing gum, cosmetics, and other products. Now retired from the university, he keeps an office in a 2-room apartment in western Tokyo, with closets full of files he had kept meticulously over the years. Dr. Endo was later placed on Mevacor, which he took for a while. In 2004, his low-density lipoprotein (LDL) cholesterol was 155 mg/dL, and he brought it down to 130 by exercising more. He won't take a statin drug; indeed, he won't take any drug.

### CHANGING CHOLESTEROL LEVELS IN AMERICAN ADULTS

Between 1960 and 2002, the average total serum cholesterol levels for US men and women aged 20 to 74 dropped from 222 to 206 mg/dL, mostly because of declines in people aged 50 and up (9). Among Americans aged 60 to 74, average levels fell from 232 to 204 in men (a 12% decline) and from 263 to 223 in women (a 15% decline). The percentage of adults with total cholesterol levels  $\geq 240$  mg/dL fell from 20% to 17%. The cholesterol levels in people <50 years of age unfortunately changed little from 1960 to 2002.

### THE AMERICAN WAISTLINE

Several studies during the past 10 years have indicated that a person's long-term health may be predicted by simply taking a waist measurement (10). Fat around the waist has been linked to a greater risk of heart disease, diabetes mellitus, stroke, hypertension, sleep apnea, disability, and some cancers, as well as higher mortality rates. The average American waistline has never been bigger. Federal health surveys show that over the past 4 decades, the mean waist size for men in the USA has grown from 35 to 39 inches; for women, from 30 to 37 inches. About 40% of men and 60% of women in the USA are carrying too much abdominal fat. As my friend Bob Vogel, MD, says, "The waist is the first thing that enters the room."

A study in *Lancet* in November 2005 showed that among 27,000 adults in 52 countries, waist size as a ratio of hip circumference (the so-called waist-to-hip ratio) more accurately predicted which men and women would have heart attacks than did any other body measure, including total weight and body mass index. Bigger waists also mean higher medical costs. Patients with 41-inch waists pay about \$2600 more per year in annual medical expenses than do those with 32-inch waists. Larger waists can lead to more low back pain, greater breathing difficulties, and persistent cough compared with people with less abdominal fat. Waist size can even forecast who will have trouble bathing, dressing, and walking in old age.

Waist circumference is far more important than simply measuring how much someone weighs. It is becoming increasingly clear that the location of the fat in our bodies is very important. The abdominal fat cells appear to be little endocrine factories and are very metabolically active. Abdominal fat drains directly into the liver; as the fat breaks down, it releases substances that increase the body's resistance to insulin. As a consequence, abdominal obesity promotes insulin resistance, which raises insulin levels, which increases appetite, which increases triglyceride levels, which causes the high-density lipoprotein (HDL) cholesterol to go down and increases sodium absorption, which causes blood volume to expand and blood pressure to go up. Hip and thigh fat—common to pear-shaped people—may actually offer some unique safeguard against cardiovascular disease. Keep the measuring tape in the white coat.

### LOW-FAT DIET AND HEALTH

The headline in *The Dallas Morning News* of February 8, 2006, stated, "Low-fat diet may be low in benefit. Study of women shows no change in cancer, heart disease risks." But, in actuality that was not quite the case (11–13). Three studies were published in the same issue of *JAMA* on February 8, 2006. All 3 studies included 48,835 postmenopausal women, aged 50 to 79 years, without prior breast cancer. Women were randomly assigned to the dietary modification intervention group (19,541) or to the comparison group (29,294). The intervention group was designed to promote dietary change with the goals of reducing intake of total fat to 20% of energy and increasing consumption of vegetables and fruit to at least 5 servings daily and grains to at least 6 servings daily. Women in the comparison group were not asked to make dietary changes and continued

their usual eating pattern. The number of women who developed invasive breast cancer over the 8.1-year average follow-up was 9% less in the intervention group. The intervention group participants reduced their percentage of energy from fat by nearly 11% more than did the comparison group at 1 year, and this difference was maintained between groups (8% at year 8). There was no evidence that the intervention reduced the risk of invasive colorectal cancer during follow-up. The LDL cholesterol and diastolic blood pressure were significantly reduced by 3.5 mg/dL and 0.31 mm Hg, respectively. Levels of HDL cholesterol, triglycerides, glucose, and insulin did not significantly differ in the intervention and comparison groups. In the intervention group, 1000 women (0.63%) developed coronary heart disease; 434 (0.28%), stroke; and 1357 (0.86%), cardiovascular disease. In the comparison group, the numbers were 1549 (0.65%), 642 (0.27%), and 2088 (0.88%), respectively. At the end of 8 years, there was only a 3% difference in percentage of calories from fat in the intervention and comparison groups! Although the diet had no significant effects on the incidence of coronary heart disease, stroke, or cardiovascular disease, there were greater reductions in coronary heart disease risks in those with lower intakes of saturated fat or *trans* fat or higher intakes of vegetables and fruits.

Most participants in these studies were overweight or obese (mean body mass index, 29.1 kg/m<sup>2</sup>), but the intervention did not address weight. There was no difference in weight between the intervention and comparison groups. The study was part of the Women's Health Initiative of the National Institutes of Health and cost the federal government \$415 million.

There is much evidence that low-fat diets decrease the frequency of atherosclerotic disease, but low fat means about 20% of energy or less from fats. In this study, by year 6, women in the intervention group received 29% of their energy from fat, compared with 37% in the comparison group. This study provides a false message. A low-fat diet is good, but it must be low.

## COFFEE AND ANTIOXIDANTS

When the Ink Spots sang, "I love the java jive and it loves me" in 1940, they had no idea how right they were. Joe A. Vincent, a chemistry professor at the University of Scranton in Pennsylvania, analyzed the antioxidant content of >100 food items, including vegetables, fruits, nuts, spices, oils, and common beverages (14). He then used data from the US Department of Agriculture on typical food consumption patterns to calculate the amount of antioxidants each food contributes to a person's diet. He concluded that the average adult consumes 1300 mg of antioxidants daily from coffee. The closest competitor was tea at nearly 300 mg, followed by bananas, 75 mg; dried beans, 70 mg; and corn, 50 mg. According to the Department of Agriculture, the typical adult American drinks 1.64 cups of coffee a day. Vincent was quick to emphasize that these numbers do not mean that coffee is a substitute for fruits and vegetables, which none of us eat enough of. The antioxidants in coffee are known as polyphenols, which are sometimes bound to a sugar molecule that is broken up by chemicals in the stomach and that

frees up the antioxidants. Thus, coffee provides more healthful antioxidants than any food or beverage in the American diet!

## COFFEE AND DIABETES MELLITUS

van Dam and Hu studied coffee consumption in 193,473 participants and found that 8394 had diabetes mellitus (15). The relative risk of having type 2 diabetes was 0.65 for individuals consuming  $\geq 6$  cups of coffee per day compared with individuals consuming either none or  $\leq 2$  cups per day. The higher coffee consumption also was consistently associated with a lower prevalence of hyperglycemia. Thus, coffee appears to be somewhat of a preventive for both atherosclerosis and diabetes mellitus.

## ALCOHOL AND COLLEGE

According to 2000 data from the National Institute on Alcohol Abuse and Alcoholism, drinking by college students aged 18 to 24 contributes to an estimated 700,000 assaults, 600,000 injuries, 100,000 sexual assaults or date rapes, and 1700 student deaths (16). When college students were asked to identify the largest problems on campus, the following were the answers: alcohol abuse, 44%; cost of education, 40%; student loan debt, 23%; lack of financial aid, 21%; drug abuse, 19%; and drunk driving, 18%. These figures came from a survey of 1200 full-time 4-year undergraduates on 100 campuses conducted in a single week in March 2005. Thus, the students clearly recognized the problem of alcohol abuse in their colleges.

Athletic events on college campuses appear to propagate binge drinking. Of the 119 schools with division 1A football teams, 54 allow the sale of alcohol at one or more athletic events. Some colleges are moving to ban alcohol from certain athletic events and to prohibit alcohol ads on local game broadcasts and during tailgating before football games. A study from the Harvard School of Public Health in 2002 questioned nearly 12,000 students, 30% of whom were sports fans. The fans were more likely than nonfans to binge drink and to have alcohol-related problems, from missing classes or falling behind in school work to vandalizing property and being involved in sexual violence. Just over half of the fans (53%) engaged in binge drinking compared with 38% of the nonfans. The study concluded that colleges should consider the link between sports and alcohol in their efforts to decrease binge drinking and the harm that it produces.

Researchers for Virginia Tech's College Alcohol Abuse Prevention Center carried handheld breath analyzers and fanned out before 4 Tech football games 2 years ago. They found that 86% of 275 tested tailgaters had consumed alcohol. Nearly half of them had blood-alcohol levels  $\geq 0.08$ , the state's legal standard for intoxication. Among the pregame tailgaters who intended to drive after the game, a third were legally intoxicated and another 13% were at risk of being cited for driving under the influence (with blood-alcohol levels between 0.05 and 0.08). Considering the large number of football games on weekends, both pro and college, these figures show the magnitude of the problem. Some tailgating is beginning at high school games as well.

## FEMALE COLLEGE ATHLETES, BODY IMAGE, AND HEALTH

Despite the opportunities that have opened up to women since Title IX of the Education Amendments of 1972 banned sex discrimination in schools that receive federal money, universities report that an increasing number of these competitors are suffering from depression and anxiety disorders (17). They struggle to juggle practices, competitions, and academic demands. Some are so overwhelmed that despite their athletic talent, they drop their sport or even drop out of college. There are extreme cases of anorexia and suicide even among elite athletes. One former athlete at Purdue University indicated that female athletes in the aesthetic sports—gymnastics, diving, cheerleading, figure skating—who are not preoccupied with body image and somewhat obsessive about what they eat are the exception. Another athletic director indicated that female athletes are driven people pleasers, almost obsessive-compulsive. Anorexia and bulimia often coexist with other emotional problems, such as anxiety and depression, according to Timothy Walsh, a professor of psychiatry at Columbia University and author of *If Your Adolescent Has an Eating Disorder*. According to one study, at least one third of female athletes have some type of disordered eating. In a 2002 study of 425 female college athletes, 43% said they were terrified of being or becoming too heavy, and 55% reported experiencing pressure to achieve or maintain a certain weight. Most said the pressure was self-imposed, but many also felt pressure from coaches and teammates.

## LEGIONNAIRES' DISEASE ON CRUISE SHIPS

More than 9.4 million passengers traveled on pleasure cruises departing from North American ports in 2004, an increase of 13% since 2003 and 41% since 2001. Cruise ships, of course, typically transport closed populations of thousands of persons, often from diverse parts of the world. Travelers are at risk of becoming ill while on board, most commonly from person-to-person spread of viral gastrointestinal illnesses. Certain environmental organisms, such as *Legionella* spp., pose a risk to vulnerable passengers. From November 2003 to May 2004, 8 cases of legionnaires' disease among persons who had recently traveled on cruise ships were reported to the Centers for Disease Control and Prevention (18). Symptoms of legionnaires' disease typically begin 2 to 10 days after exposure. Person-to-person transmission does occur. Because its symptoms (fever, cough, or chest pain) are nonspecific, legionnaires' disease cannot be reliably distinguished from other forms of pneumonia on the basis of clinical presentation alone. The 8 passengers had been aboard 5 different cruise ships and associated with 7 different voyages. Two of the 8 cases were fatal. Fun seems to always elicit some price.

## AGE-RELATED MACULAR DEGENERATION

Age-related macular degeneration (AMD) is the most prevalent cause of irreversible blindness in developed countries. Recently, high-dose supplementation with beta-carotene, vitamins C and E, and zinc were shown to slow the progression of AMD. In a study from Rotterdam, the Netherlands, of 4170 participants, AMD occurred in 560 after a mean follow-up of

8 years (19). Dietary intake of both vitamin E and zinc was inversely associated with AMD. A relatively high intake of all 4 nutrients—beta-carotene, vitamin C, vitamin E, and zinc—was associated with a 35% reduced risk of AMD. Although antioxidants may not reduce the frequency of cardiovascular disease, they appear to be good for the eyes.

## STIMULANT DRUGS

Drugs for attention deficit/hyperactivity disorder (ADHD) include Ritalin, Adderall, Focalin, Methylin, Metadate, and Concerta. In February 2006, an FDA advisory panel recommended by a vote of 8 to 7 to display information about possible cardiovascular risks in a black-box warning on the drugs' labels and package inserts (20). Physicians in the USA wrote >31 million prescriptions in 2005 for these stimulant ADHD drugs. Proof that these drugs increase the risk of cardiovascular problems is by no means clear. It may take years to learn whether these drugs do cause adverse cardiovascular reactions.

## CHARACTERISTICS OF AN ABUSIVE INDIVIDUAL

Dr. Clinton Van Zandt described some characteristics and early warning signs of an abusive individual (21). This person was probably abused as a child—either psychologically, physically, or sexually. While growing up, he may have lacked a positive male role model or had an abusive authority figure, either a man or a woman. The abusive person exhibits a violent temper, has already been abusing others, such as family members, friends, or animals, and may have vandalized property. The abusive person is controlling and jealous. He may view and own pornographic materials, especially bondage and child pornography, and abuse alcohol and other substances. This person has a very low or an exceedingly high self-image, an inability to admit guilt, an insensitivity to others' feelings, and an inability to discuss his own feelings. He lies frequently, even for no apparent reason.

Abusive individuals will exhibit many of the above-mentioned characteristics. Nonabusive individuals may also exhibit some of these characteristics at points in their lives but with less frequency and duration than abusive individuals.

## PROTECTING CHILDREN FROM PREDATORS

Dr. Van Zandt's LiveSecure.org website also provides some good tips for child safety to empower children and encourage them to develop their intuition (22). First, Dr. Van Zandt encourages parents to communicate openly about safety issues, including potential abductions. The lures abductors use should be explained. Some of the advice is common sense, like knowing where children are at all times and keeping a list of their friends' phone numbers and addresses. But he goes on to remind parents to update children's photos and records once or twice a year, to talk through what to do if children get lost (his advice is for the child to find a woman with children, an information desk, or a police officer), and to ensure that children know their own address and phone number, parents' other contact numbers, and how to use pay phones and make collect calls. Dr. Van Zandt said to never label clothing or personal items with the child's

name and encouraged role play of potential situations so that children are prepared.

His ten tips for children can be summarized as follows.

- Do not hitchhike, get into any car, or even go near a car unless your parents have told you to. Recognize that adults have no reason to ask any child for help—e.g., to give directions or help find a pet. If anyone appears to be following you or wants to take you somewhere, run away and yell.
- Don't leave your own yard or go places alone.
- If an adult asks you to keep something a secret, do not. Instead, tell your parents or a teacher.
- Don't let a stranger take your picture.
- If someone—even a relative or friend—tries to take you somewhere against your will or touches you inappropriately, tell them no.
- Practice a low, loud, long yell. This yell tells the perpetrator that you will not be an easy victim, and it also calls for help. Yelling can give you the courage to run.

### CENTENNIAL OF FROZEN-SECTION TECHNIQUE

William Welch of the Johns Hopkins School of Medicine was the first American pathologist, according to Gal and Cagle, to use the frozen-section technique during surgery, and he used a carbon dioxide freezing microtome (23). In 1891, the eminent surgeon William Halsted sent a breast biopsy for intraoperative examination to Welch, who attempted to perform a frozen section. By the time Welch could interpret the results, Halsted had finished the operation. In 1895, Cullen published the first description of a frozen-section technique using prefixation with formalin in the *Bulletin of the Johns Hopkins Hospital*. According to Gal and Cagle, however, the most widely accepted frozen-section technique and the one that has stood the test of time was the procedure of Lewis R. Wilson at the Mayo Clinic, who published in the December 1905 *JAMA*.

### SLEEP

Jerome Siegel, a researcher at the University of California's Neuropsychiatric Institute, has analyzed the sleeping habits of 60 mammals (24). The amount of sleep among animals varies enormously. The three-toed sloth needs about 14 hours of sleep daily and is then far from perky. In contrast, the African elephant needs only about 3 hours of sleep daily. Meat eaters get more sleep than grazers, and omnivores fall somewhere in between. For example, meat-eating cheetahs doze for 12 hours a day, while grazing horses sleep only 2 or 3 hours a day. Similarly, lions sleep 15 to 20 hours a day, while giraffes can go for weeks without getting even a 5-minute nap—and then they sleep standing up. There is no need for a lioness to be out hunting in the day after she kills an antelope and eats it. She'll only waste energy. But, a giraffe, which can eat about 60 kilograms of twigs and leaves a day, needs to keep at it to get enough calories and nutrition and needs to stay awake to escape predators. In other words, sleep is either very important or not so important for different reasons in different animals.

While sleep may not be important for horses or giraffes, it may still perform a vital function for humans. It appears that

7 or 8 hours a night is ideal for humans because people who get significantly more or less than that are more likely to die younger, although it is not clear why. The 7 to 8 hours of sleep is less than is needed by other animals that eat meat and fruits and vegetables, including other primates. Chimpanzees get 10 hours of sleep a day. Siegel suggests that evolution may have favored people who go to bed later and get up earlier.

Among all terrestrial mammals, babies sleep more than adults. All mammals that live on land have rapid-eye-movement (REM) sleep. REM sleep in humans is associated with dreams. The same kind of eye movement has been noted in nonhuman animals. Dogs, for example, will often bark and twitch their legs during REM sleep, but humans do not know whether dogs or other mammals dream.

Why do we need sleep? Conventional wisdom suggests that sleep has a single, vital function in all animals just as food and water do, but no one is exactly sure what that function is. Siegel has argued that sleep may not be related to intellectual function. It may be important for conserving energy, processing memories, or preparing one to learn survival skills.

### RISING HEALTH CARE COSTS

Everybody knows that health care costs in the USA are increasing each year and are threatening many basic industries, but not everyone knows that health care costs now consume 16% of the nation's economic output, the highest proportion ever (25). The nation's health care bill continues to grow substantially faster than inflation and wages, increasing by almost 8% in 2004, the most recent year with near-final numbers. The overall cost of health care—hospital and physician bills, pharmaceuticals, medical equipment, insurance, and nursing home and home health care—doubled from 1993 to 2004 according to the Centers for Medicare and Medicaid Services. In 2004, the nation spent almost \$140 billion more for health care than in 2003. In 1997, health care accounted for 13.6% of gross domestic product. The health care increase of 7.9% in 2004 was almost 3 times the overall national inflation rate, which was 2.7%.

### THE BUSH BUDGET

In February 2006, President Bush submitted his new budget to Congress (26). It is \$2.77 trillion for the fiscal year starting October 2006. That averages \$9,293.62 for every American! The budget includes a request for Iraq of about \$96 billion, which brings the cost of that war to \$322 billion, an average of \$11,080.34 per US citizen. That is money each American owes. About 45% of the federal government's revenue comes from individual income taxes. Also, there is slightly over \$20 billion for Afghanistan in the new budget. We simply can't afford Iraq in either lives or money.

### LIVE-ACTION SURGERY VIDEOS

Consumers clicking through a health insurance website may happen upon live-action surgery videos (27). There is a diabetic foot ulcer procedure in which forceps peel away dead tissue as blood drips down the foot. There is skin cancer footage in which

a scalpel cuts into the hand of an elderly woman, and there is a cataract video, which shows a needle piercing an eye. The videos are designed to educate patients about their health and help them go into surgery with realistic expectations, according to the companies that created the videos and the insurers and employers making them available to workers. They are also designed to save money, the companies say. Health care administrators believe that the videos may persuade people to take better care of themselves so they don't need complicated, expensive procedures—or they at least ask physicians more questions before operations. The videos essentially tell patients that this is their future if they keep up unhealthy habits.

Videos of surgical procedures are among the latest tools, from preventive-care guides to online drug cost software, that insurers and health plan administrators are using to educate patients. It is part of the push toward consumer-driven health care, a movement that encourages patients to be more discriminating shoppers, in part by requiring them to spend more of their own money. The live-action material like the foot surgery and cataract videos was created by WorldDoc Inc., a business started in Las Vegas in 1999 by a group of 14 doctors.

### TOP 5% OF HOSPITALS

Health Grades Inc., a health care ratings company in Golden, Colorado, surveyed the nation's 5122 nonfederal hospitals and released a list of the top 5% of hospitals in the country in terms of patient care (28). Of the top 5%, 15 are in Texas, including 2 in Dallas, namely Baylor University Medical Center and the University of Texas Southwestern University Hospitals. For the latest survey, Health Grades studied the Medicare records of 39 million patient visits from 2002 to 2004, looking at the outcomes of 26 inpatient procedures including back and neck operations, coronary artery bypass, hip replacement, and prostatectomy. The survey found that patients are 27% less likely to die at the nation's top 277 hospitals than at the other 95% of US hospitals. Patients are also 14% less likely to develop complications at the elite hospitals. Almost 153,000 lives might have been saved if all US hospitals had performed at the level of the top institutions over those 3 years.

### HOSPITAL BUILDING BOOM IN NORTH TEXAS

The Dallas–Fort Worth area is in a hospital building boom (29). Twenty-nine local hospitals have almost \$2.2 billion in construction projects under way, including 5 brand-new hospitals and 29 other medical facilities or additions to present facilities. Nearly a quarter (\$485 million) of that \$2.2 billion is for construction projects of the Baylor Health Care System. North Texas is one of the hottest markets in a nationwide hospital building boom that has produced \$100 billion in facilities in the last 5 years. The population of Texas is expected to double within 20 years, going from 5.4 million to 10 million. Additionally, the Texas population is aging and will require more care for chronic illnesses. By 2040, one in 5 Texans will be >65 years of age, double today's proportion. Fewer government restrictions on health care construction also have made the Dallas–Fort Worth boom especially big. Unlike other states, Texas does not

require hospitals to obtain a “certificate of need” to open new facilities or to expand.

### EDUCATING TEXANS

Steve Murdock, Texas' official demographer, has been speaking statewide stressing that in the next 30 years if the state does not embrace its challenges, the workforce will be less educated, less skilled, and more reliant on state services (30). Mr. Murdock has been telling us for years that if Texas wants to be more competitive, it needs to get more kids to graduate from high school and college. In 2000, only 3 of 4 Texans 25 years of age and older had high school diplomas, putting Texas 45th in the national graduation rates. Of those high school graduates, only 24% had college degrees. Of those in Texas presently having college degrees, 30% are white, 15% are black, and 9% are Hispanic. In <20 years, 75% of Texas workers will be non-Anglos. With Latinos and blacks sharing dismal high school graduation rates and being least likely to go to college, these figures should scare legislators and educators into figuring out how to help those trailing far behind. Our prosperity depends on it.

### FUTURE SCIENTISTS

According to the Business Roundtable, if current trends continue, by 2010 >90% of the world's scientists and engineers will live in Asia (31). Failing to reverse that trend will result in a “slow withering” of US economic might, so warns this group. According to the National Science Foundation, the percentage of undergraduate degrees awarded in engineering (in 2000, the latest year for which data are available) were as follows: China, 39%; Taiwan, 23%; Germany, 20%; Japan, 19%; and USA, 5%. Math and science scores of high school students in the USA are lackluster at best when compared with those of international competitors. And most high school math and science teachers are not capable of taking students to a higher level. The National Academy of Sciences recommends doubling the number of engineering graduates in the USA by 2015. President Bush in his State of the Union speech in February 2006 signed on to this recommendation.

### PAY OF CHIEF EXECUTIVE OFFICERS

Although the income of physicians is certainly good, it is much lower than that of leaders of large American businesses. Consider the following (32): Chief Executive Officer (CEO) Larry Ellison holds the record for highest executive compensation in a single year: \$706 million in 2001. Sanford I. Weill, former CEO of Citigroup, is the only CEO to get >\$1 billion in total compensation over the past 15 years. In 1960, the ratio of the average Fortune 500 CEO pay to the US president's salary was 2 to 1. Today it is 30 to 1. In 1930, Babe Ruth made \$80,000. When asked why he made more than President Hoover, he responded, “I had a better year than he did.” The highest-paid athlete now is Tiger Woods, who makes about \$80 million a year, or about \$220,000 a day. The highest-paid CEO in 2004 was Terry Semel of Yahoo, with \$230 million, or \$630,000 a day. John Mackey, CEO of Whole Foods Markets, limits his pay to ≤14 times the pay of his average employee. The

average CEO's salary in the USA now is 475 times greater than the average worker's salary; in Japan, it is 11 times greater; in France, 15 times; in Canada, 20; in South Africa, 21; and in Britain, 22. The USA is out of line.

### **SPEAKING OF RETIREMENT**

Let's all do like Ted Williams did: he hit a home run in his last time at bat (33). Famed jockey Jerry Bailey, who retired in January 2006 after a 31-year career and 2 Kentucky Derby wins, had a rougher farewell. His horse kicked him in the hip just before his final race. Commercial airline pilots have to retire at age 60. Some of them and some of us start a new career at that age. Those who are 60 and healthy and at ideal body weight can usually expect to live 30 more years. Some recent genetic studies indicate that human longevity should be about 160 years. In 1900 the average American lived 48 years; in 2000, 78 years; and in 2100, 110 years if the trend continues.

### **RECORD TROPICAL STORM SEASON**

The 2005 Atlantic hurricane season had 26 named storms, including 13 hurricanes (34). Rita, Katrina, Dennis, and Wilma all struck land as category 3 hurricanes or greater. Katrina was the only category 4. Category 3 means sustained winds between 111 and 130 miles per hour, and category 4 means winds between 131 and 155 miles per hour. Katrina killed at least 1309 people; Rita, about 100; Wilma, 35; and Dennis, 14. The estimated damage in the USA in billions was \$100 by Katrina, \$12 by Wilma, \$10 by Rita, and \$2 by Dennis. The highest sustained wind speed in 3 of these 4 hurricanes was 175 miles per hour. According to the National Oceanic and Atmosphere Administration's Climate Prediction Center, warm ocean water helps fuel storms, and water temperatures in the Atlantic were 2 to 3 degrees above average in 2005. There also was an absence of winds high in the atmosphere that can tear hurricanes apart, and winds blowing east from Africa steered developing storms toward warmer waters where they incubated into tropical storms and hurricanes. Despite a rise in ocean temperatures worldwide in recent decades, there has not been a worldwide increase in the number or intensity of tropical storms. Only the Atlantic Ocean has had an increase, which most students of these storms attribute to natural cycles, not to oceanic warming.

### **REPEAT ABORTIONS**

According to the Guttmacher Institute, close to half of the 1.3 million abortions performed in the USA each year are repeat abortions, up from just 12% in 1973 (35). In 2000, the Centers for Disease Control and Prevention reported that nearly 20% of abortions performed in the USA were on women seeking at least their third pregnancy termination. Despite its prevalence, repeat abortion is the least discussed or researched aspect of abortion in the USA. Studies so far suggest that women having repeat abortions as compared with those having first-time abortions are more likely to be minorities, poor, and victims of sexual abuse.

### **PREPARING FOR THE BICENTENNIAL OF THE BIRTH OF CHARLES DARWIN**

Charles Darwin was born on February 12, 1809, the same day Abraham Lincoln was born. Thus, the bicentennial of his birth will be celebrated in 2009. Two Darwin anthologies have just appeared, each containing all 4 of his books: *Voyage of the Beagle*, *On the Origin of Species by Means of Natural Selection*, *The Descent of Man*, and *Selection in Relation to Sex*, and *The Expression of the Emotions in Man and Animals* (36, 37). One of the anthologies contains a foreword by James D. Watson of DNA fame, and the other contains a long introduction by Edward O. Wilson, the Harvard professor for nearly 5 decades and the author of 20 books on biology, evolution, and biodiversity. In November 2005, a new show on Charles Darwin opened at the American Museum of Natural History in New York City (38). The exhibit features beetles, fossils, and ferns and 2 live Galapagos tortoises like the ones Darwin rode bareback. It also features some artifacts of his life: his tiny single-shot pistol, his magnifying glass and rock hammer, and the Bible that traveled the world with him, a reminder that before his voyage he had been studying for the ministry. The show will travel to Boston, Chicago, and Toronto before ending its tour in London in 2009.

Darwin was only 22 years old and an amateur naturalist when he set sail in December 1831 on the HMS *Beagle*. He had been recruited for the voyage largely to provide company for the *Beagle's* aloof and moody captain, Robert FitzRoy. The purpose of the mission was to chart the coast of South America. The ship sailed from Plymouth, England, up and down Argentina, through the treacherous Strait of Magellan into the Pacific before returning home by way of Australia and Capetown. Toward the end of the voyage, the *Beagle* spent 5 weeks at the remote archipelago of the Galapagos, home to the giant tortoises, black lizards, and a notable array of finches. Here Darwin began to formulate some of the ideas about evolution that would appear nearly a quarter century later in *The Origin of Species*, which since the day it was written has been among the most influential books ever published.

Darwin has always been fascinating. His own life exemplifies the painful journey from moral certainty to existential doubt. He was an exuberant outdoorsman who embarked on one of the greatest adventures in history but then never again left England. He lived for a few years in London before marrying his first cousin, Emma, and moving to a country house where he spent the last 40 years of his life writing, researching, and raising his 10 children, to whom he was extraordinarily devoted. The ideas of *The Origin of Species* took shape in Darwin's notebooks as far back as the 1830s. But, he held off publishing until 1859, and then only because he learned that a younger scientist, Alfred Russel Wallace, had come up with a similar theory (39).

Darwin was afflicted throughout his later life by intestinal distress and heart palpitations, which kept him from working for more than a few hours at a time. There are 2 theories about the cause of this mysterious illness: a parasite he picked up in South America or anxiety over where his intellectual journey was leading him and the world. It appeared to many, including his

own wife, that the destination was plainly hell. Darwin knew full well what he was up to as early as 1844, when he wrote to a friend that he would publish his thoughts on evolution and they would be akin to confessing a murder. To a society accustomed to searching for truth in the pages of the Bible, Darwin introduced the notion of evolution: that the lineages of living things change, diverge, and go extinct over time, rather than appear suddenly in immutable form. A corollary is that most of the species alive now are descended from one or at most a few original forms.

By itself this was not a wholly radical idea. Darwin's own grandfather, the esteemed Erasmus Darwin, had suggested a variation on that idea decades earlier (40). But, Charles Darwin was the first to muster convincing evidence for it. His crucial insights came from the islands of the Galapagos, populated by species that bore obvious similarities to animals found 600 miles away in South America—but differences as well and smaller differences from one island to another. To Darwin's mind, the obvious explanation was that the islands had been colonized from the mainland by species that then evolved along diverging paths. He learned that it was possible to tell on which island a tortoise was born from its shell. Darwin's greater and more radical achievement was to suggest a plausible mechanism for evolution. To a world taught to see the hand of God in every part of nature, he suggested a different creative force altogether, an undirected, morally neutral process he called "natural selection." Others characterized it as "survival of the fittest," although the phrase has taken on a connotation of social and economic competition that Darwin never intended.

Darwin was very much influenced by Thomas Malthus and his idea that predators, disease, and a finite food supply place a limit on populations that would otherwise multiply indefinitely. Animals are in a continuous struggle to survive and reproduce, and it was Darwin's insight that the winners, on average, must have small advantages over those who fall behind. His crucial insight was that organisms that by chance are better adapted to their environment—a faster wolf or deer—have a better chance of surviving and passing those characteristics on to the next generation. Of course, it's not as simple as outrunning the competition. If the climate changes, a heavier coat might represent the winning edge. For certain species, intelligence has been a useful trait. Evolution is driven by the accumulation of many small changes, culminating in the emergence of an entirely new species.

And there was an even more troubling implication to his theory. To a species that believed that it was made in the image of God, Darwin's great book addressed only this one cryptic sentence: "Much light will be thrown on the origin of man and his history." Although Darwin struggled with questions of faith his whole life, he ultimately described himself as an agnostic. But, he reached that conclusion through a different, although well-traveled, route. William Howarth, an environmental historian who teaches a course at Princeton called "Darwin in our time," dates Darwin's doubts about Christianity to his encounters with slave-owning Christians—some of them no doubt citing Scripture as justification—which deeply offended

Darwin, an ardent abolitionist. More generally, Darwin apparently was troubled with the problem of evil: How could a benevolent and omnipotent God permit so much suffering in the world he created?

Darwin obviously shook the world with his books, and the world is still vibrating from them.

#### GENERAL DOUGLAS MCARTHUR'S RULES OF LEADERSHIP

Colonel Larry R. Donnithorne in his book, *The West Point Way of Leadership*, published a list of questions General McArthur developed to guide him in his leadership duties (41). Maybe these rules are useful for physicians as well:

- Do I heckle my subordinates or strengthen and encourage them?
- Do I use moral courage in getting rid of subordinates who have proven themselves beyond doubt to be unfit?
- Have I done all in my power by encouragement, incentive, and spur to salvage the weak and erring?
- Do I know by name and character a maximum number of subordinates for whom I am responsible? Do I know them intimately?
- Am I thoroughly familiar with the technique, necessities, objectives, and administration of my job?
- Do I lose my temper at individuals?
- Do I act in such a way as to make my subordinates want to follow me?
- Do I delegate tasks that should be mine?
- Do I arrogate everything to myself and delegate nothing?
- Do I develop my subordinates by placing on each one as much responsibility as he or she can stand?
- Am I interested in the personal welfare of each of my subordinates, as if he or she were a member of my family?
- Have I the calmness of voice and manner to inspire confidence, or am I inclined to irascibility and excitability?
- Am I a constant example to my subordinates in character, dress, deportment, and courtesy?
- Am I inclined to be nice to my superiors and mean to my subordinates?
- Is my door open to my subordinates?
- Do I think more of position than job?
- Do I correct a subordinate in front of others?



—WILLIAM CLIFFORD ROBERTS, MD  
17 February 2006

1. Browne A. Chinese doctors tell patients to pay upfront, or no treatment. *Wall Street Journal*, December 5, 2005.
2. French HW. Wealth grows, but health care withers in China. *New York Times*, January 14, 2006.
3. Bristol N. Reconstructing Afghanistan's health system. *Lancet* 2005; 366(9503):2075–2076.
4. Kugler S. In NY, thin is in at City Hall. *Dallas Morning News*, January 15, 2006.
5. Kristof N. Repairing health care. *Dallas Morning News*, February 6, 2006.

6. Madeb R, Koniaris LG, Schwartz SI. The discovery of insulin: the Rochester, New York, connection. *Ann Intern Med* 2005;143(12):907–912.
7. Hunt SA, Abraham WT, Chin MH, Feldman AM, Francis GS, Ganiats TG, Jessup M, Konstam MA, Mancini DM, Michl K, Oates JA, Rahko PS, Silver MA, Stevenson LW, Yancy CW, Antman EM, Smith SC Jr, Adams CD, Anderson JL, Faxon DP, Fuster V, Halperin JL, Hiratzka LF, Jacobs AK, Nishimura R, Ornato JP, Page RL, Riegel B; American College of Cardiology; American Heart Association Task Force on Practice Guidelines; American College of Chest Physicians; International Society for Heart and Lung Transplantation; Heart Rhythm Society. ACC/AHA 2005 guideline update for the diagnosis and management of chronic heart failure in the adult: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *Circulation* 2005;112(12):e154–e235.
8. Landers P. How one scientist intrigued by molds found first statin. *Wall Street Journal*, January 9, 2006.
9. Carroll MD, Lacher DA, Sorlie PD, Cleeman JI, Gordon DJ, Wolz M, Grundy SM, Johnson CL. Trends in serum lipids and lipoproteins of adults, 1960–2002. *JAMA* 2005;294(14):1773–1781.
10. Spake A. The belly burden. *US News & World Report*, November 28, 2005.
11. Prentice RL, Caan B, Chlebowski RT, Patterson R, Kuller LH, Ockene JK, Margolis KL, Limacher MC, Manson JE, Parker LM, Paskett E, Phillips L, Robbins J, Rossouw JE, Sarto GE, Shikany JM, Stefanick ML, Thomson CA, Van Horn L, Vitolins MZ, Wactawski-Wende J, Wallace RB, Wassertheil-Smoller S, Whitlock E, Yano K, Adams-Campbell L, Anderson GL, Assaf AR, Beresford SA, Black HR, Brunner RL, Brzyski RG, Ford L, Gass M, Hays J, Heber D, Heiss G, Hendrix SL, Hsia J, Hubbell FA, Jackson RD, Johnson KC, Kotchen JM, LaCroix AZ, Lane DS, Langer RD, Lasser NL, Henderson MM. Low-fat dietary pattern and risk of invasive breast cancer: the Women's Health Initiative Randomized Controlled Dietary Modification Trial. *JAMA* 2006;295(6):629–642.
12. Beresford SA, Johnson KC, Ritenbaugh C, Lasser NL, Snetselaar LG, Black HR, Anderson GL, Assaf AR, Bassford T, Bowen D, Brunner RL, Brzyski RG, Caan B, Chlebowski RT, Gass M, Harrigan RC, Hays J, Heber D, Heiss G, Hendrix SL, Howard BV, Hsia J, Hubbell FA, Jackson RD, Kotchen JM, Kuller LH, LaCroix AZ, Lane DS, Langer RD, Lewis CE, Manson JE, Margolis KL, Mossavar-Rahmani Y, Ockene JK, Parker LM, Perri MG, Phillips L, Prentice RL, Robbins J, Rossouw JE, Sarto GE, Stefanick ML, Van Horn L, Vitolins MZ, Wactawski-Wende J, Wallace RB, Whitlock E. Low-fat dietary pattern and risk of colorectal cancer: the Women's Health Initiative Randomized Controlled Dietary Modification Trial. *JAMA* 2006;295(6):643–654.
13. Howard BV, Van Horn L, Hsia J, Manson JE, Stefanick ML, Wassertheil-Smoller S, Kuller LH, LaCroix AZ, Langer RD, Lasser NL, Lewis CE, Limacher MC, Margolis KL, Mysiw WJ, Ockene JK, Parker LM, Perri MG, Phillips L, Prentice RL, Robbins J, Rossouw JE, Sarto GE, Schatz IJ, Snetselaar LG, Stevens VJ, Tinker LF, Trevisan M, Vitolins MZ, Anderson GL, Assaf AR, Bassford T, Beresford SA, Black HR, Brunner RL, Brzyski RG, Caan B, Chlebowski RT, Gass M, Granek I, Greenland P, Hays J, Heber D, Heiss G, Hendrix SL, Hubbell FA, Johnson KC, Kotchen JM. Low-fat dietary pattern and risk of cardiovascular disease: the Women's Health Initiative Randomized Controlled Dietary Modification Trial. *JAMA* 2006;295(6):655–666.
14. Associated Press. Wake up to this: coffee is good for your health, study says. *Dallas Morning News*, August 29, 2005.
15. van Dam RM, Hu FB. Coffee consumption and risk of type 2 diabetes: a systematic review. *JAMA* 2005;294(1):97–104.
16. Wieberg S. Colleges are reaching their limit on alcohol. *USA Today*, November 17, 2005.
17. Hellmich N. Athletes' hunger to win fuels eating disorders. *USA Today*, February 6, 2006.
18. Centers for Disease Control and Prevention. Cruise-ship-associated Legionnaires disease, November 2003–May 2004. *JAMA* 2005;294(24):3080–3081.
19. van Leeuwen R, Boekhoorn S, Vingerling JR, Witteman JCM, Klaver CCW, Hofman A, de Jong PTVM. Dietary intake of antioxidants and risk of age-related macular degeneration. *JAMA* 2005;294(24):3101–3107.
20. Rubin R. Warnings advised on ADHD drugs. *USA Today*, February 10, 2006.
21. Van Zandt C. The characteristics and early warning signs of an abusive spouse or partner. Available at <http://www.msnbc.msn.com/id/11347968/>; accessed February 16, 2006.
22. Van Zandt C. Protecting children and teens. Available at <http://www.livesecure.org/>; accessed February 16, 2006.
23. Gal AA, Cagle PT. The 100-year anniversary of the description of the frozen section procedure. *JAMA* 2005;294(24):3135–3137.
24. Siegel JM. Clues to the functions of mammalian sleep. *Nature* 2005;437(7063):1264–1271.
25. Kaufman M, Stein R. Record share of economy is spent on health care. *Washington Post*, January 10, 2006.
26. Neuhart A. Iraq, not homeland, Bush budget buster. *USA Today*, February 10, 2006.
27. Rubenstein S. Health insurers show employees graphic surgery videos. *Wall Street Journal*, November 30, 2005.
28. Moos B. Two Dallas hospitals rated tops. UT Southwestern, Baylor listed in national survey. *Dallas Morning News*, February 7, 2006.
29. Moos B. Building fever. North Texas is one of the nation's hottest markets for hospital construction. *Dallas Morning News*, January 22, 2006.
30. Unsigned editorial. Texas of the future. It will depend on getting kids educated now. *Dallas Morning News*, December 19, 2005.
31. Gelles K. Reward future scientists. *USA Today*, February 2, 2006.
32. Etter L. Are CEOs worth their weight in gold? *Wall Street Journal*, January 21–22, 2006.
33. Zaslow J. Final flights: retirement rituals soften the bittersweet side of leaving a career. *Wall Street Journal*, February 2, 2006.
34. Vanden Brook T. Record year for hurricanes part of a natural cycle. *USA Today*, November 30, 2005.
35. Franke-Ruta G. Just one 'mistake.' Pro-choicers need to take honest look at repeat abortions. *Dallas Morning News*, November 27, 2005.
36. Darwin C. *Darwin: The Indelible Stamp. The Evolution of an Idea. Edited, with Commentary, by James D. Watson*. Philadelphia: Running Press, 2005 (1260 pp).
37. Darwin C. *From So Simple a Beginning. The Four Great Books of Charles Darwin. Edited with Introduction by Edward O. Wilson*. New York: WW Norton, 2006 (1706 pp).
38. Adler J. Charles Darwin. Evolution of a scientist. *Newsweek*, November 28, 2005.
39. Shermer M. *In Darwin's Shadow. The Life and Science of Alfred Russel Wallace. A Biographical Study on the Pathology of History*. Oxford, UK: Oxford University Press, 2002 (422 pp).
40. King-Hele D. *Erasmus Darwin*. New York: Charles Scribner's Sons, 1963 (183 pp).
41. Donnithorne LR. The West Point way of leadership. Quoted in *Texas Medicine*, January 2006.