Author's note: This is a rough draft of a book I am working on, in which I reveal the major errors I made in *The Skeptic's Dictionary* (2003: Wiley & Sons). Because I am getting much lazier as I age, I doubt if I will finish the other eleven chapters I have planned.

1

Acupuncture & CAM

I was way wrong about acupuncture. First, I was wrong to claim that acupuncture has been practiced in China for more than 4,000 years. The earliest manuscripts of Chinese medicine date from the second century BCE and they make no mention of acupuncture. A tomb of a Chinese prince dating from the second century BCE contained a set of four gold and five silver needles, but it is speculation that the needles were designed for acupuncture. Stone needles thought to be 5,000 years old have been found in a tomb in Mongolia, but how the needles were used is speculative. Ancient cultures around the world have used needles on humans for such things as tattooing, scarifying, burning, cauterizing, lancing, piercing, and bloodletting. Did the Chinese teach the rest of the world these things? Did they learn them from others? Did they develop independently in Europe, Egypt, Arabia, etc.? When and where acupuncture began is unknown. But it is doubtful that sticking needles in many parts of the body, as is common today by acupuncturists, would have been looked upon with favor until the needles were very thin and unlikely to cause pain and infection without sterilization. According to Hanjo Lehmann:

> And no matter which needles were used – once puncturing the skin, there were always two dangers. First, due to the lack of anatomical knowledge, the danger that any deep puncturing might damage internal structures or inner organs. Second, the danger that these needles, usually without disinfection of neither needle nor skin, caused inflammations, purulency or infections.

> And although people in ancient time knew nothing about microbes, they knew very well that needling could do harm to the body....there are good reasons why there was always an inborn aversion of man against anything artificial inserted in the body.
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> Therefore, common sense lets us expect that acupuncture even in ancient China rarely was a standard therapy, but usually a therapy for special cases.

Willem ten Rhijne (1647-1700), a Dutch physician, was the first European to write a detailed account of Chinese and Japanese medicine. He also coined the term acupuncture--acus means needle in Latin and pungere means to prick--and was responsible for bringing the practice to Europe. (There is an image posted here of a sexless European's acupoints from ten Rhijne's treatise *Dissertatio de arthritide: Mantissa schematica: De acupunctura: et orationes tres, I. De chymiae ac botaniae antiquitate & dignitate: II. De physiognomia: III. De monstris*. [London: R. Chiswell, 1683].) According to Eleanor Cracknell, assistant archivist of the College of St. George, ten Rhijne made "little attempt to understand the theoretical basis behind Chinese thought."

In *Dissertatio de Arthritide; Mantissa Schematica; De Acupunctura; et Orationes Tres*, ten Rhyne states that the principles of Japanese and Chinese medicine are too difficult to explain, so rather than focusing on the theory, he concentrates on the practice itself, paying particular attention to pain relief, treatment of gout and arthritis. Ten Rhyne believed that the build-up of wind or energy in the body caused the pain, and by puncturing the skin, the wind would be released, curing the patient.

(http://www.stgeorges-windsor.org/archives/archive-features/image-of-the-month/title1/on-acupuncture.html)

The first use of the term 'acupuncture' that also connected needling with chi, meridians, yin and yang, was by the 20th century Frenchman George Soulié de Morant (1878-1955). Morant spent nearly twenty years in China at the beginning of the twentieth century. He spent the next 40 years actively promoting acupuncture among medical professionals in Europe. Just before his death in 1955, he completed *L'Acuponcture chinoise*, which introduced the notions of qi (chi) as energy (or life force) and meridians as the pathways of qi. In 1943, the first society of acupuncturists in the West was founded in Paris (Imrie). Auricular acupuncture was invented by French Physician Dr. Paul Nogier, who saw in the ear an inverted fetus.

According to Jan Willem Nienhuys (personal correspondence), the introduction of fine steel needles in Japan and China was a 20th century development. The needles in *De Acupunctura* of Willem ten Rhijne "were quite thin, not of steel, and they were inserted through a tube to prevent buckling. A small hammer was used (presumably to exert forces exactly in the direction of the needle). Soulié imitated a Japanese acupuncture innovator (ca. 1920) who worked with thin steel needles but Soulié himself had rather thick needles made by a Parisian jeweler. In 1929 the Chinese physicians in the Republic of China voted more or less unanimously for a prohibition of all acupuncture. At that time the acupuncturists used political influence to cancel this prohibition, but soon thereafter they changed to thin steel needles."

So, while acupuncture was being promoted in the West as an ancient healing art that could cure just about anything, it was being banned in China and Japan. After the introduction of scientific medicine in those countries, efforts were made to stifle ancient medical superstitions and myths. In 1822, the Chinese emperor Daoguang forbade the use of acupuncture and moxibustion by the physicians of the imperial court (Lehman 2013). Mao Zedong promoted Chinese medicine for political and practical reasons, but he did not use it or believe in it himself. Acupuncture came to the attention of the Western world in dramatic fashion when it was widely reported in 1971 that James Reston, the *New York Times* journalist, had undergone an appendectomy in Beijing with the only anesthesia being provided by acupuncture. In fact, he had chemical anesthesia for the operation and acupuncture was administered *afterward* to relieve pain. Reston allegedly reported that about an hour after the acupuncture treatment he felt pain relief. Was the relief due to the acupuncture? Perhaps. It may also have been due to his having a bowel movement. Did the acupuncture cause his bowel movement? I don't know, but I do know that after this story was reported in the Western press, acupuncture began its current run as the darling of alternative medicine in the West. Simultaneously, acupuncture has grown less popular in China. It might be of interest to some readers that The National Council Against Health Fraud (NCAHF) found that of the 46 medical journals published by the Chinese Medical Association, not one is devoted to acupuncture or other so-called "traditional" Chinese medical practices.

Perhaps I was wrong to define acupuncture as "a traditional Chinese medical technique for unblocking chi by inserting needles at particular points on the body to balance the opposing forces of yin and yang." While many proponents of acupuncture

consider this description to be accurate, many others think it is misleading to theorize about how acupuncture works. Perhaps, they say, it works by blocking pain signals or by releasing endorphins or by some other unknown physical mechanism. To bring in chi flowing along meridians and balancing yin and yang is to confuse the issue, according to some people.

I was certainly wrong to have stated that chi allegedly flows "through the body along 14 main pathways called meridians." Tradition has it that there are 12 main pathways and some minor pathways. I still do not see any good reason for believing that chi is an energy that allegedly permeates all things. There are a number of energy therapies that make this claim. Oddly, they produce similar results in practice and in laboratory tests. Scientific studies over the past few years have supported my original position: the beneficial effects of acupuncture and other forms of energy medicine are probably due to "a combination of expectation, suggestion, counter-irritation, operant conditioning, and other psychological mechanisms." Similar results have been obtained for true acupuncture, sham acupuncture (pretending to stick needles into a person), acupressure (where acupoints are touched but not needled), reiki and therapeutic touch (where the therapist allegedly manipulates chi without touching the patient at all), Tong Ren (a kind of voodoo acupuncture where one strikes acupoint marks on a doll with a hammer to release energy), and distant healing (where the healer doesn't need to be in the physical presence of the patient). Apparently, as long as the patients believe they are getting energy treatment, they get some relief, but it doesn't really matter whether the patient is stuck with needles, touched or not, or even in the presence of the healer. Of course, there is no way to disprove the claims that coming near the acupoints, thinking

about them, or hitting effigies of them triggers the unblocking of chi. But such explanations seem superfluous when there are simpler explanations that can plausibly account for the same data: placebo effects and non-placebo effects. In fact, developments in modern physics and biology since the 19th century have rendered unnecessary all forms of vitalism and explanations of biological processes in terms of energies that can't be measured by any scientific instrument but can be felt by something much less sensitive, the human hand.

The evidence from many high caliber scientific studies have shown that many forms of energy healing relieve many people of many symptoms and that this is probably due to one or more of the following factors, some of which are referred to as placebo factors, some as *false* placebo factors (because in some studies their effects have been erroneously attributed to the placebo effect):

- classical conditioning
- suggestion by the healer
- patient beliefs in the competence of the healer and in the method of healing
- patient expectancy and hope for recovery
- the healer's manner (showing attention, care, affection, sincerity, knowledge)
- the color of the treatment room or the color of the pill one is given (might affect patient expectancy)

- the rituals and theater involved in the delivery of the treatment, including technical jargon, special uniforms, medical gadgetry, treatment room set-up, and the like
- spontaneous improvement (the pain or illness runs its natural course to its natural conclusion)
- fluctuation of symptoms
- regression to the mean
- additional simultaneous treatment from scientific medicine
- patient politeness or subordination (the patient doesn't want to disappoint the healer)
- neurotic or psychotic misjudgment
- psychosomatic phenomena

It is possible, of course, that energy healers are affecting the balance of yin and yang or Cheech and Chong by the butterfly effect or some other magical procedure, but such explanations seem unnecessary and farfetched.

Another error I made was in referring to many alternative therapies as "useless" or "ineffective." Most of these therapies that now go under the heading of CAM, complementary and alternative medicine, are useful and effective. However, they are no more useful or effective than placebos or doing nothing. In fact, the expression "alternative and complementary" seems designed to describe treatments that seem to have a positive effect but have not been shown to have any effect beyond a placebo effect or in making no intervention. There seems to be no harm in offering them *in addition to* treatments based on scientific medicine. Homeopathic remedies, for example, may be

inert and have nothing in them but water or alcohol, but because of conditioning and other placebo factors, even inert substances can have a positive (or negative) effect on people. Some studies have found that acupuncture and the placebo treatment of sham acupuncture can stimulate an opiod response and lead to the release of natural painkillers. Many people do not understand that placebos can have physical effects. They think that if a placebo has an effect, it must be "all in their head." Not true. The effect can be in their arm or foot or left ear.

On the other hand, I was correct in claiming; "Traditional Chinese medicine is not based on knowledge of modern physiology, biochemistry, nutrition, anatomy, or any of the known mechanisms of healing." What has happened is that many current proponents of acupuncture try to retrofit traditional acupuncture to modern scientific knowledge. This procedure is little more than a game of confirmation bias: looking for ways to confirm what is already believed. Most people do not realize how easy it is to make up an explanation that fits with one's beliefs. To do so is rather trivial, however, from a scientific point of view, where the goal should be to *falsify* claims rather than confirm them. It is possible that all ancient cultures had advanced medical knowledge but lost it to natural or human disasters. It seems more plausible, however, that our ancestors were scientifically illiterate, as is indicated by such misconceptions as that the heart functions as the seat of consciousness and memory. To speculate that the ancients knew more than modern scientists isn't justified. Our ancestors knew a lot of things about plants as medicines—knowledge they acquired by trial and error. We have better methods today and our results, while imperfect, are much more reliable than those of the village shaman or witch doctor two millennia ago. In fact, it is because of our understanding of the

complexity of placebo effects, conditioning, and the other factors listed above, that we are able to grasp why the village shaman could be successful, even though his medicine bag was little more than a bag of tricks. Most illnesses don't kill you. You will recover from almost anything that ails you whether you get treatment or not. A little song and dance, a puff of smoke here or there, some magic tricks on occasion, accompanied by appropriate dress, rituals, and incantations and *voila*: the cure. I was wrong in suggesting, however, that the patients of practitioners of scientific medicine don't benefit from placebo and false placebo factors. All healing, whether scientific, pseudoscientific, or magical benefits from placebo and false placebo factors.

While I was wrong to suggest that CAM therapies are useless, I was not wrong to claim that "integrative medicine" is "quackery mixed with scientific medicine." The term "integrative medicine" was popularized by Andrew Weil, M.D., a graduate of Harvard Medical School but one who did not complete a residency nor, as far as I can ascertain, ever take the medical boards in any state. (He did a one-year internship at Mt. Zion Hospital in San Francisco.) Instead of practicing medicine, Weil traveled and studied indigenous medicine as practiced in South Dakota and various places in South America. For the past thirty years, he has made his living writing and lecturing on alternative medicine. Dr. Weil founded the Arizona Center for Integrative Medicine at the University of Arizona. Weil integrates scientific medicine with Ayurvedic medicine (herbal and dietary medicine allegedly originating in ancient India) and other "natural" cures. One of his main tenets is: "It is better to use natural, inexpensive, low-tech and less invasive interventions whenever possible." There is no compelling scientific evidence for the claim that natural interventions are generally superior to artificial ones. If a natural herb

and a powerful pharmaceutical have the same medicinal effect, the herb will probably have fewer adverse side-effects. But, as far as I know, there are no herbs that have the same medicinal effect as powerful pharmaceuticals. Millions of people use herbs and natural products, such as calcium, echinacea, ginseng, ginkgo biloba, glucosamine, saw palmetto, shark cartilage, and St. John's wort. All of these, when tested scientifically, have failed to support the traditional wisdom regarding their healing powers. Pharmaceuticals and other treatments are much superior to most herbal remedies. If a plant has been shown to be effective as a healing agent, the active ingredient has been extracted and tested scientifically and is part of scientific medicine. Otherwise, any beneficial effect following use of the herb or plant is probably best explained as due to the placebo effect, natural regression, the body's own natural healing processes, or to some other non-herbal factor. It should be noted that many people take vitamin and mineral supplements, both natural and synthetic, in the mistaken belief that there is sound scientific evidence that such supplements contribute to well being or can prevent cancer or heart disease. So far, the scientific evidence overwhelmingly indicates that vitamin and mineral supplements provide no health benefits in general. In fact, some supplements have been linked to negative consequences. Vitamin E supplements, for example, have been linked to an increased risk for lung cancer.

The appeal of Weil's integrative medicine is that he mixes sound scientific knowledge and advice with illogical hearsay. For example, when I checked his Men's Health Internet page in 2008, he provided scientific information regarding men with prostate problems. He offered common sense advice such as don't ingest caffeine and alcohol if you are having trouble with frequent urination, since these substances will

increase the need to urinate. But he also advised men to eat more soy because: "Asian men have a lower risk of BPH and some researchers believe it is related to their intake of soy foods." BHP stands for *benign prostatic hyperplasia* (an enlargement of the prostate that occurs with aging.) He ignored the scientific evidence that there are high rates of cancers of the esophagus, stomach, thyroid, pancreas and liver in Asian countries. Should we blame these high rates on the consumption of soy? Of course not. Correlation is not causation. Weil also states that saw palmetto "may help" BPH because: "There is clinical evidence that saw palmetto can help shrink the size of the prostate, and it may help promote healthy prostate function." There is also strong clinical evidence that saw palmetto *doesn't* help shrink the size of the prostrate. It is not good medicine to pick and choose only those studies that support your biases.

Another thing I was wrong about was in underestimating the power of experience to deceive us by a variety of cognitive and perceptual illusions to the point where we refuse to accept the evidence from scientific studies if that evidence doesn't support a strongly held belief. I was also wrong, however, to put too much trust in scientific studies. I was right to suggest that single studies in medicine rarely justify drawing grand conclusions about anything positive, but I should have encouraged more skepticism regarding scientific studies in general.

Let's say a drug addict named Shirley is said to suffer from a disease (let's call it *drugophilia*) and has been awarded one million dollars by a jury after she sued her boss for firing her for being stoned on the job once too often. (He was found to have violated the Americans with Disabilities Act.) The boss also has to pay for her medical treatment. Say she chooses to get treated with acupuncture. I understand why Shirley might think

that the acupuncture was the most significant causal factor in her treatment, if she did actually overcome her addiction. But subjective certainty of a causal connection is of little relevance to the accuracy of the general claim: *acupuncture is an effective causal agent in the treatment of addiction*. To provide compelling evidence for such a claim we need controlled studies, not anecdotes. In our individual experience we are unable to control for dozens of other factors that might be significant. We are likely to give too much credit to the one thing that actually had little or no effect. While it might be *relevant* for Shirley to think the acupuncture was a significant factor in her treatment, it is insufficient. All she knows for sure is that first she got the acupuncture and afterwards she overcame her addiction. But just because one thing happened before another doesn't prove it caused it. There might other factors involved that Shirley isn't even aware of. Maybe her newfound wealth has increased her self-esteem and cranked up her motivation to give up the drugs. Maybe she's also in counseling and taking medication. Maybe she really believes in acupuncture and is certain that the little needles are giving her the strength to resist her urges. Sadly, even if high caliber scientific studies find that acupuncture is a very effective treatment for heroin addiction, Shirley still won't know for sure that acupuncture was an important causal factor in helping *her* overcome *her* addiction. On the other hand, if scientific studies show that acupuncture is no better than doing nothing for an addiction, then she can be pretty sure that the treatment was irrelevant as a *direct* cause of her overcoming the addiction. But it still might be an indirect cause, e.g., if it was mainly her *belief* in acupuncture that provided her with the strength needed to overcome her urges, then we could say that the acupuncture was an *indirect* cause and *indirectly* brought about the desired effect. This might explain why

Shirley's friend Hank, also an addict but one who thinks acupuncture is bollocks, wasn't helped by the acupuncture. If acupuncture is a direct and significant causal factor in overcoming heroin addiction, then it shouldn't matter whether the patient believes in it or not. If scientific studies show that it is a *direct* cause, then we would be justified in putting money into acupuncture treatment programs for heroin addicts. If the studies show that acupuncture is no more effective than a placebo or doing nothing, then we should probably put our money elsewhere.

Another thing I was wrong about was in not emphasizing the importance of having a low attrition rate in a controlled study. A scientist can give the false impression that acupuncture, for example, is a great method for treating heroin addicts by not mentioning the attrition rate in the study. By omitting this information, the scientist can make the data appear to show that the acupuncture group did significantly better in treatment than did the non-acupuncture group. Some studies present a false sense of success only because they don't mention, for example, that 60% of those getting acupuncture to cure their heroin addiction dropped out of the study before it was completed. Guess who dropped out and who stayed in the study, and guess what that can make the data look like?

It's clear from the testimonial and scientific evidence that acupuncture benefits some people some of the time for some conditions, particularly for the relief of pain. It's also clear that acupuncture doesn't benefit anyone for some conditions, even though there are published studies that conclude otherwise. The evidence tells me that it is criminal, for example, to treat infertility with acupuncture. (I'll return to this claim below.)

It's clear from the scientific studies that some medical interventions, whether by acupuncture or scientific medicine, appear effective but aren't. Apparent effectiveness is due to false placebo effects such as regression to the mean or a disease running its natural course. It is also clear from scientific studies and careful observation that some medical interventions are necessary for recovery. The evidence does not support the claim that acupuncture is a necessary treatment for a single ailment, however. If acupuncture is beneficial on its own or as a complement to scientific treatment for any condition, it is so because of conditioning and placebo factors such as patient expectation and confidence in the treatment. It's also clear that sticking needles in people is irrelevant for acupuncture to work, but appearing to do so is apparently necessary for it to work.

Knowing these things and given my experience with scientific medicine (as a patient), I can see no reason to consult an acupuncturist for any ailment I might have. I understand, however, why practitioners and patients alike are convinced that the benefits of acupuncture are due to sticking needles into people. I'm not expecting these folks to change their minds about acupuncture on the basis of the evidence, which they will probably interpret differently. After all, there are plenty of opportunities for confirmation bias on both sides of this issue. Skeptics will continue to note any case where acupuncture doesn't help someone or causes harm, and we will continue to identify high caliber studies that support the hypothesis that acupuncture works by conditioning and placebo effects. Believers will continue to point to their successes and to the scientific studies that seem to support their viewpoint, while ignoring or misinterpreting the occasional high-caliber published study that concludes otherwise. Believers have the additional advantage of having on their side popular celebrities like "Deepak" Oprah and

her celebrity doctor friend Mehmet Oz. A single celebrity endorsement carries more weight with many people than a thousand high-caliber scientific studies, especially with people who have a low opinion of scientific medicine. People who have had bad experiences with conventional medicine, or who are believers in the Big Pharma/AMA conspiracy to keep us sick so they can make money, can easily find examples of experiences that support favoring acupuncture or other forms of alternative treatment over scientific medicine. To them I say: I hope all your ailments are minor ones, but if you have a heart attack or a stroke I hope others will make sure you get the best treatment that scientific medicine has to offer.

I encourage more research on acupuncture and therapies like homeopathy and chiropractic, as long as they have controls that try to tease out placebo and false placebo elements. I encourage more research on hypnotherapy, but not to tease out placebo elements. I agree with R. Barker Bausell that hypnosis and placebos are "so heavily reliant upon the effects of suggestion and belief that it would be hard to imagine how a credible placebo control could ever be devised for a hypnotism study."

I encourage more research in scientific medicine that tries to tease out placebo and false placebo elements of a treatment. It's possible that many of the medications that physicians prescribe will be found to be no more effective than placebos. That wouldn't mean that the medications aren't effective, of course. But it would mean that the chemicals in the pills aren't the causal agents they are thought to be. (Some scientists think this is true of Prozac and some other anti-depressants, for example.)

To those acupuncturists who come to realize that their medicine works, but is a placebo treatment, you have a decision to make. You can act as one shaman did when he

realized his medicine worked no matter what he did: you can continue with the rituals and arcane ceremonies associated with your art. It would be easy to rationalize, since you are helping people. You may even be helping people who otherwise wouldn't get any treatment from anyone. You'll have many satisfied customers and may make a decent living as well. You'll get a lot of communal reinforcement from other practitioners, the popular media, journalists, and celebrities. Unfortunately, unlike the hypnotherapist, you could not practice your art without deception. The hypnotherapist can openly admit that she is using the power of suggestion, conditioning, massaging patient beliefs, and the like. I know some consider any kind of deception unethical. I don't. I think that sometimes deception of ourselves and others can be justified if it is likely to bring about more good than harm. I'm what is labeled in some circles as a rule utilitarian and situation ethicist. I don't think that knowingly treating patients with placebos is always unethical, but this is not the place for a detailed defense of that position.

The danger from acupuncture is that it is being promoted as superior to scientific medicine, when in fact it is clearly inferior. Acupuncture is touted as appropriate for almost any disorder or disease in man or beast, when the evidence clearly shows that such a belief is a dangerous delusion. People go to acupuncturists for treatment of AIDS, allergies, arthritis, asthma, Bell's palsy, bladder and kidney problems, breast enlargement, bronchitis, colds, constipation, cosmetics, depression, diarrhea, dizziness, drug addiction (cocaine, heroin), epilepsy, fatigue, fertility problems, fibromyalgia, flu, gynecologic disorders, headaches, high blood pressure, hot flushes, irritable bowel syndrome, mental illness, migraines, nausea, nocturnal enuresis (bedwetting), pain, paralysis, post traumatic stress disorder (including rape victims), PMS, sciatica, sexual

dysfunction, sinus problems, smoking, stress, stroke, tendonitis, vision problems, and just about anything else that might ail a human being.

Recently, another application, called "battlefield acupuncture," has been promoted by Dr. Richard Niemtzow, the first official acupuncturist in the U.S. armed forces. Niemtzow believes that inserting tiny semi-permanent needles into very specific acupoints in the skin on the ear blocks pain signals from other parts of the body and prevents them from reaching the brain. He has done some studies but none of them used proper methods: randomized, placebo-controlled studies with at least 50 soldiers as subjects and designed to demonstrate this alleged blocking of pain signals. The United States Air Force began teaching "battlefield acupuncture" to physicians who will be deployed to Iraq and Afghanistan in early 2009. Niemtzow believes ear acupuncture can be used on the battlefield to relieve pain without worry about side effects (including addiction) or adverse reactions, which are apparently a problem with pain-killing drugs.

Niemtzow's enthusiasm for acupuncture far exceeds his evidence for its efficacy. In my opinion, the Air Force is using American soldiers as guinea pigs and will not be providing our men and women on the battlefield with the best that medicine has to offer should they be wounded in battle.

Niemtzow's website says he specializes in acupuncture for dry mouth and dry eye, but he also treats obesity and a few other things. He's written that he and his cohorts use at least ten different kinds of acupuncture treatments for the following list of disorders:

> fibromyalgia, protruding disks, reflex sympathetic dystrophy, degenerative disk disease, spinal stenosis, frozen shoulder, peripheral neuropathy secondary to

> diabetes or chemotherapy, torticolis, overuse syndromes, abdominal pain of unknown etiology, tendonitis, carpal tunnel syndrome, arthritis, osteoarthritis, migraines ... obesity, nicotine abuse, dry mouth and dry eyes from various etiologies, hot flashes, chronic fatigue along with depression, and dermatological conditions such as eczema....

Some critics of acupuncture might be skeptical of any modality that has the kind of variety that acupuncture has. Not only can it be used for hundreds of different kinds of ailments, acupuncture as practiced in China is not the same as that practiced in Korea or Japan or many other places. Even acupuncturists trained in the same tradition will evaluate and treat the same patient differently. R. Barker Bausell, an expert in biostatistics, served for five years as the director of research at the university of Maryland's NIH-funded Complementary Medicine Program (now called the Center for Integrative Medicine). He found it disconcerting that there was no consistency in either diagnosis or treatment recommendations among three "experienced TCM (traditional Chinese medicine) physicians" who examined the same group of patients identified as having rheumatoid arthritis. Bausell knows how to tell a well designed and implemented medical study from a faulty or incompetent one, and he knows how to evaluate the statistical data that is the backbone of such studies. But the fact that three experts would disagree so fundamentally about diagnosing and treating the same patients, even when they knew that the patients all suffered from the same disease, led him to conclude that even if there is some physiological basis for acupuncture, "it would be worthless." Why? Because highly trained experts "came up with completely different conclusions when examining the same patients." I disagree.

Even if acupuncture is practiced differently by each and every practitioner, it could still have some value for its placebo effects. It may not be important where the needles are inserted or even *whether* they are inserted, as long as the acupuncturist conveys to the patient that he knows what he's doing and is following some justifiable ritual that is part of a tradition with a long list of satisfied customers, and as long as the patient believes the treatment is curative. Whether there is something physical to acupuncture may not matter to its utility, but then maybe it doesn't matter whether the diagnosis or treatment is "correct." Maybe there is no correct or incorrect diagnosis or treatment for many ailments. The only problem I see with having dozens of different styles of acupuncture applied in hundreds of different ways is that there might be some disorders for which acupuncture, while not harmful in itself, may be ineffective and prevent a patient from seeking effective treatment from scientific medicine.

I mentioned above that I think it is criminal to treat infertility with acupuncture. Here's why. Bill Reddy, a practicing acupuncturist who believes that "acupuncture is a thoroughly proven system of healthcare," notes that PubMed alone lists some 13,000 published studies on acupuncture. Obviously, I am not going to run through these studies one by one. Reddy claims that "countless studies have proven acupuncture's effectiveness in improving the viability and diameter of ova." He selects one such study for discussion. I assume he selected it because it is typical or he thinks it is one of the better studies. It was published in 1993 in the *Journal of Chinese Medicine* by Mo et al. Reddy notes that the "total effective rate was 82.35%," whatever that might mean. He quotes from the article, but he seems to gloss over the fact that the researchers are very cautious in their claims, using the word 'may' to qualify their conclusions:

> ...the results also showed that acupuncture *may* adjust FSH, LH, and E2 in two directions and raise the progesterone level, bringing them to normal. The animal experiments confirmed this result. Results showed that acupuncture *may* adjust endocrine function of the generative and physiologic axis of women, thus stimulating ovulation. (emphasis added)

Furthermore, this study had no control group and was small (34 patients). The authors also make some unsubstantiated claims that Reddy doesn't mention, e.g., that acupuncture at the Chong and Ren channels "nourishes uterus to adjust the patient's axis function and recover ovulation." Also, we should note that researchers at the University of Oklahoma studied more than 97 patients who were getting in-vitro fertilization, some of whom were also getting acupuncture 25 minutes before and after the embryo was transferred from the test tube to the womb. The pregnancy rate of the group that did *not* receive acupuncture was 69.9 percent, while 43.8 percent of women in the group that did get acupuncture treatment did not conceive. These data strongly indicate that acupuncture has no positive effect on fertility. Defenders of the view that acupuncture assists IVF cite a meta-study to support their position. I have a problem with meta-studies, but in this case there is also a meta-study that does *not* support their position. It's easy to see why there would be conflicting meta-studies.

A meta-analysis is a study that lumps together the data from several independent studies and does a statistical analysis on the data as if they were collected in a single, large study. One of the major problems with meta-studies is that researchers must be selective in choosing which studies to include in their analysis. Some studies will have to be rejected because they are fatally flawed: they're too small, use no controls, didn't

randomize the assignment of subjects, or the like. Different researchers will include and exclude different studies. Even if they agree on the criteria used to determine which studies to include, they will often disagree on the application of the criteria. In the end, one will often find two meta-studies that contradict each other and each side will claim the other excluded studies that should have been included or they included studies that should not have been included. A common accusation is that if the researcher got a positive result it was because he excluded too many studies that got negative results. Or, if the researcher got a negative result, it was because he included too many negative studies or didn't include enough positive studies. Furthermore, the media often have no clue as to how to properly evaluate a meta-analysis.

For example, a meta-study by Eric Manheimer et al. appeared in the *British Medical Journal* called "Effects of acupuncture on rates of pregnancy and live birth among women undergoing in vitro fertilisation [IVF]: systematic review and meta-analysis." The news media hailed the study as finding evidence that acupuncture improves the chances of successful fertilization. The authors of the study, however, note that the connection between acupuncture and fertilization "is far from proven." They call their evidence "preliminary" and state that it "suggests that acupuncture given with embryo transfer improves rates of pregnancy and live birth among women undergoing in vitro fertilisation." The media erroneously reported that the data showed a 65% increase in fertility in those treated with acupuncture, when the actual figure was closer to 10%. Furthermore, acupuncture researcher Peter Braude claimed that "the BMJ paper didn't include all the studies, and if you include the negative ones there is no effect." I don't have a horse in this race, so I am not going to track down all the studies and come up

with my own list of which ones should be included or excluded. I should note, however, that Braude supervised a team of researchers that recently finished a meta-study on acupuncture and IVF treatment that found no effect. The results of their work was presented in 2008 to the European Society of Human Reproduction and Embryology conference in Barcelona, Spain. The researchers identified 83 trials in the medical literature, of which 13 were found to be of suitable quality to be included in the meta-analysis. The way to avoid these kinds of conflicting reports is to avoid meta-analysis and do single studies that use large samples.

Now, back to Dr. Niemtzow. He may be doing evidence-based or science-based medicine, but he is definitely not doing scientific medicine. He speculates that acupuncture is a science that may "eclipse Newtonian physics" but this belief is based on little more than his faith in ancient Chinese metaphysics (especially the concept of chi) and a lack of curiosity that leads him to forgo randomized, double-blind, controlled studies to ferret out such things as placebo effects from false placebo effects. His claim that sticking needles in the ear blocks pain signals (from bullet wounds to the leg or back?) is not based on good science. There are millions of people in pain who would love to be able to block pain signals by putting little pins in their ears. If he could prove it's true, he'd have his Nobel and my thanks as well. He may have evidence for his beliefs, but the evidence is not very good and it certainly shouldn't persuade a reasonable person to think his beliefs are based on solid science.

Scientific medicine isn't perfect, but it doesn't claim to have a treatment for everything, much less a *single* treatment for everything. Furthermore, scientific medicine has numerous examples of treatments that have been shown to be effective independently

of conditioning, placebo, or false placebo factors. Acupuncture has no such examples. As long as acupuncture is limited to such things as treating nausea from chemotherapy, it is a laughable delusion and will probably be effective for some patients. When acupuncture is used *instead of* chemotherapy to treat cancer, it will become a dangerous delusion. The same should be said of other alternative treatments known to be placebos, such as homeopathic remedies. As long as homeopathy is used to treat nausea or insomnia, it is laughable. But when homeopathy is used to prevent malaria, AIDS, or pregnancy it becomes a dangerous delusion.

What has become increasingly clear from acupuncture studies that use proper controls is that acupuncture is a placebo therapy: the effects of acupuncture are not significantly different from the effects of placebos or of making no intervention. A study that compares one group given acupuncture and another group given pills, exercise, massage, or some other sort of therapy is not a properly controlled study because such a design cannot measure the placebo effect or the effect of doing nothing. A properly controlled acupuncture study is one that is double-blind, randomized, and uses a control group. The only proper control group for an acupuncture study is a group that receives sham acupuncture. A double-blind acupuncture study would be one where neither the therapist nor the patient knows who is getting true acupuncture. (How could the therapist not know who is getting the true acupuncture?) True acupuncture is acupuncture that sticks needles into traditional acupuncture points on the body to traditional depths. Sham acupuncture is of at least three types. One type inserts needles into non-traditional sites at the same depth as traditional acupuncture. Another does the same but to a shallower depth. The third type uses a method that prevents the needles from actually being inserted

into the body. It is important that the patients in the sham group think they are getting true acupuncture. It is equally important that the acupuncturist not indicate to the subjects in any way whether she is delivering true or sham acupuncture. Any study where the patients can easily detect whether they are getting true acupuncture is an invalid study because it cannot measure the placebo effect.

Some researchers obviously do not understand the placebo effect. When they compare true and sham acupuncture groups to a third group getting some other kind of therapy and find that the two acupuncture groups show a significant positive effect over the third group, they don't realize such a result supports the position that acupuncture works by the placebo effect.

A proper acupuncture study would randomly assign at least 50 patients to either a true or sham acupuncture group and not reveal to the patients which group they have been assigned to. Comparing an acupuncture group to a group that does not get acupuncture is an invalid study, unless one is trying to measure the different degrees of effectiveness of placebo treatments. A proper acupuncture study should not have a high dropout rate and would, if appropriate, involve follow-up reviews to measure long-term effectiveness.

The most difficult thing to evaluate about acupuncture studies reported in the media is how careful the researchers were in disguising the acupuncture from the subjects. Subjects in such studies usually have a high expectation of effectiveness, so if they suspect they are not in the true acupuncture group, the placebo treatment will not be as effective. On the other hand, if those in the sham acupuncture group think they are getting true acupuncture, one should find the placebo treatment to be effective.

So, to the person who asks the skeptic to explain how acupuncture relieved her back pain or took away her wrinkles or subdued her hot flashes, one should reply: Placebos really do work! Only a person who does not understand the placebo effect would claim that acupuncture can't be a placebo since it was effective. Being effective is a necessary condition for a therapy to be ethically advocated, but it is not a sufficient condition. We know enough from the acupuncture studies that have been done that acupuncture is no more effective than a placebo or making no intervention. This means that acupuncture will have many satisfied customers as long as people are susceptible to suggestion and classical conditioning, believe in the effectiveness of acupuncture, and have it administered by someone who is seen as a knowledgeable and trustworthy healer. We should not forget that snake oil salesmen have always had many satisfied customers and it isn't because their snake oil contains healing properties beyond that of other placebos.

Okay, Mr. Skeptic, one might say. But if acupuncture is just a placebo, how could it help my dog or horse? Ever hear of Pavlov and classical conditioning? You should look it up. It's also possible that it didn't help your dog or horse, but you perceive it that way to confirm your bias.

If an acupuncture study has been properly done and has found that acupuncture is more effective than a placebo for some ailment or condition, one should say: That's great. Now, let's wait and see if it can be replicated. Single studies in medicine should rarely be taken to be significant. Once we get some replication in independent labs, we can feel confident we aren't dealing with a fluke study and start looking for a non-placebo explanation for the effectiveness of acupuncture. We don't have to know why a treatment

is effective in order to know that it is effective. But it would be illogical to try to figure out why something's effective before we show that it is effective.

If you read about an acupuncture study in the media, try to get a copy of the published paper or at least an abstract so you can get a better idea of what the researchers tried to do and what they actually accomplished. Stories based on press releases from universities or conferences may not be unbiased and completely informative. The actual data is important to help us judge whether claims like "50% improvement" really mean anything. If the absolute numbers are very small, the percentages can be grossly misleading and of no statistical significance. Also, some news reports are about unpublished papers given at conferences. Such papers may never go through a proper peer review or get published in a peer-reviewed journal.

What about homeopathy, naturopathy, and other "alternatives"?

I was wrong about homeopathy on at least two counts. One, I should have been more vigorous in criticizing the work of Jacques Benveniste and the claim that homeopathic remedies, which are nothing but water, work because water has a "memory" of some active ingredient that it once had contact with. And I should have been more emphatic in claiming that homeopathy's long list of satisfied customers is probably due to a set of beliefs and rituals that get lumped under the vague heading of "the placebo effect."

Scientists like Jacques Benveniste (1935-2004), who claim to know how homeopathy works, have put the cart before the horse. Benveniste claimed to have proven that homeopathic remedies work by altering the structure of water, thereby allowing the water to retain a "memory" of the structure of the homeopathic substance

that had been diluted out of existence. The work in Benveniste's lab was thoroughly discredited by a team of investigators sent by *Nature* to evaluate an attempted replication Benviniste's work. Neither Benveniste nor any other advocate of the memory-of-water speculation have explained how water has forgotten all the other billions of substances its molecules have been in contact with over the millennia, but it remembers just the contact with the homeopathic substance. Benveniste claimed that a homeopathic solution's biological activity can be digitally recorded, stored on a hard drive, sent over the Internet, and transferred to water at the receiving end. He was a successful biologist working in a state-run lab until he started making such claims, which cost him his status and reputation as a reputable scientist. Since homeopathic remedies are inert, there is no need for a physical or mechanistic explanation as to how they work. What there is need of is an explanation for why so many people are satisfied with their homeopath despite all the evidence that homeopathic remedies are inert and no more effective than a placebo.

There have been several reviews of various studies of the effectiveness of homeopathic treatments and not one of these reviews concludes that there is good evidence for any homeopathic remedy (HR) being more effective than a placebo. Homeopaths have had over 200 years to demonstrate their wares and have failed to do so. Sure, there are single studies that have found statistically significant differences between control groups and groups treated with an HR, but none of these have been replicated or they have been marred by methodological faults.

A review of five reviews of homeopathic studies has been done by Terence Hines who found that more than 100 studies have failed to come to any definitive positive conclusions about homeopathic potions. There have been at least 12 scientific reviews of

homeopathy published since the mid-1980s. Guess what? Homeopathic remedies are not more effective than placebos or no intervention (Ramey 2000). Why is homeopathy so popular? One reason is the prevalence of a misunderstanding of the causes of disease and how the human body deals with disease. Samuel Hahnemann, the father of homeopathy, was able to attract followers because he appeared to be a healer compared to those who were cutting veins to bleed out bad humors or using poisonous purgatives to balance humors. More of his patients may have survived and recovered not because he healed them, but because he didn't infect them or kill them by draining out needed blood or weaken them with strong poisons. Hahnemann's medicines were essentially nothing more than common liquids and were unlikely to cause harm in themselves. He didn't have to have too many patients survive and get better to look impressive compared to his competitors. If there is any positive effect on health it is not due to the homeopathic remedy, which is inert, but to the body's own natural curative mechanisms; the beliefs of the patient, and the manner of the homeopath. Let me explain.

Stress can enhance and even cause illness. If a practitioner has a calming effect on the patient, that alone can result in a significant change in the feeling of well-being of the patient. That feeling might well translate into beneficial physiological effects. The homeopathic method involves spending a lot of time with each patient to get a complete list of symptoms. It's possible this attentiveness has a significant calming effect on some patients. This effect could reduce stress and enhance the body's own healing mechanisms in some cases. As homeopath Anthony Campbell (2008) puts it: "A homeopathic consultation affords the patient an opportunity to talk at length about her or his problems

to an attentive and sympathetic listener in a structured environment, and this in itself is therapeutic." In other words, homeopathy is a form of psychotherapy.

> ....most homeopaths like to allow at least 45 minutes for a first consultation and many prefer an hour or more. Second, patients feel that they are being treated "as an individual". They are asked a lot of questions about their lives and their likes and dislikes in food, weather, and so on, much of which has no obvious connection with the problem that has led to the consultation. Then the homeopath will quite probably refer to an impressively large and imposing source of information to help with choosing the right "remedy". (Campbell)

We know that the sum of all the scientific evidence shows clearly that homeopathic remedies are no more effective than placebos. This does not mean that patients don't feel better or actually get better after seeing a homeopath. That is quite another matter and is clearly the reason for the many satisfied customers.

So, I was wrong to imply that most homeopathic "cures" are mostly due to misdiagnosis, spontaneous remission (the disease running its natural course), natural regression, or some other therapy being used along with homeopathy. The bulk of the satisfied customers are probably satisfied because they believe the homeopath knows what he's doing and that the medicine is effective. The patient believes in the homeopath because he appears to have a vast knowledge of remedies, has impressive books and shelves of potions for everything under the sun, is calm and confident, has many success stories to share, gives hope and confidence to the patient, relaxes and eases the stress the patient may be experiencing, and a number of other things that generally are lumped together as "the placebo effect." It is easy to understand why a homeopathic physician,

with hundreds or thousands of satisfied customers, would read the scientific literature differently than an independent, unbiased observer who doesn't care one way or the other whether homeopathy is superior to placebo medicine. The homeopath with years of experience seeing his patients helped, he is sure, by his medicine, will be highly motivated to latch onto studies that find homeopathy works and to be less critical of such studies than he would be of those who find the opposite. It is easy to rationalize the methodological faults of studies that don't support one's hypothesis, and it is easy to gloss over the faults of studies that fit with one's beliefs. To settle the issue fairly, however, it is necessary that a large-scale, randomized control study be done that is designed to measure placebo effects and demonstrate that at least some of the effects from the homeopathic remedy are not due to placebo effects.

I still have no reason to believe there are any "vital forces" or "subtle energies" that cause such remedies as homeopathic potions or oils used in aromatherapy to be effective. I realize that one of the reasons so many "alternative" treatments are attractive to many people is because they are thought to be "natural." It is assumed by many people that if a therapy is natural, it is superior to one that is synthetic. This belief is a bias, not based on compelling scientific evidence and I see no reason to change my mind about natural cures.

Finally, I understand the dangers of scientific medicine. An acupuncturist or homeopath is not as likely as a science-based surgeon, say, to do great damage by malpractice. There are much greater risks in surgery, anesthesia, and pharmaceuticals than there are in ingesting water, sniffing herbs, or having a few needles stuck in one's ear. There is the occasional chiropractor who does great damage but, for the most part,

scientific medicine has the potential for causing greater harm than do most alternatives. On the other hand, scientific medicine also does the most good, if by good we mean helping people live longer, healthier lives. Disease would be rampant without scientific medicine. Life expectancy would be much lower. A simple operation in 1998—insertion of a stent in one of my arteries—has kept me alive for more than a decade. Had the same operation been available to my grandfather and father, they might not have died of a heart attacks in their early 50s. Had insulin not been available to my mother, it is very unlikely that she would have lived into her 70s. But for most of the things that ail people—the colds and minor aches and pains—the pill or shot the scientifically trained physician provides may be just a placebo and an alternative therapy would have worked just as well. I was wrong to say or imply that alternative therapies are useless or ineffective. They're not, unless you have something seriously wrong with you. In which case, I suggest you see someone trained in scientific medicine who practices scientific medicine. Jacques Benveniste did. He didn't go to a homeopath for his heart problems. He went to a surgeon. Unfortunately, the surgeon couldn't help him and he died shortly after surgery. Moral of the story? If you want immortality, don't go to a surgeon. Scientific medicine is powerful, but it can't keep you alive forever.

In the meantime, maybe you can live longer and healthier by changing your diet, meditating, avoiding pharmaceuticals in favor of natural herbs, or by believing in a higher power. Many people seem to think so. I took them to task in *The Skeptic's Dictionary*. How wrong was I?

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