COMMENT

Complementary and Alternative Medicine: Opportunities for Education and Research

AVIAD HARAMATI[1] AND MICHAEL D. LUMPKIN

Department of Physiology and Biophysics, Georgetown University School of Medicine, Washington, DC 20057

Over a decade ago, Eisenberg and colleagues (1) reported that one in three adults in the United States used at least one complementary or alternative medical therapy. Further investigations revealed that, in addition to the United States, other industrial countries, including those in Western Europe, Australia, and Israel, were also observing increased interest and demand for complementary and alternative medicine (CAM). Indeed, more than 60% of physicians in those countries have been recommending CAM to their patients. Surprisingly, among this group of physicians, 47% were using CAM themselves (2, 3). In a follow-up national survey, Eisenberg *et al.* (4) reported a substantial increase in the use of CAM in the United States (from 34% in 1990 to 42% in 1997), as well as a dramatic rise in the estimated number of visits to alternative medicine practitioners. The most commonly used modalities include spirituality and prayer, herbal medicines, and chiropractic. The prevalence is even greater in patients with chronic illnesses, such as AIDS, where reports suggest over 80% of patients use CAM (5).

According to Astin (6), the majority of alternative-medicine users appear to be doing so not so much because they are dissatisfied with conventional medicine, but largely because they find these health-care alternatives to be more congruent with their own values, beliefs, and philosophical orientations toward health and life. Yet, despite the dramatic increase in the use of alternative medical care, less than 40% of the therapies used are disclosed to the physician (5). Although both patient and physician are likely to play a role in this communication breakdown, the public's perception is that the majority of mainstream physicians are reluctant to discuss nonconventional therapies with their patients. Jonas (7) has warned that "as the public's use of healing practices outside conventional medicine accelerates, ignorance about these practices by physicians and scientists risks broadening the communication gap between the public and the profession that serves them."

Many medical leaders have called for physicians to become more knowledgeable about alternative medicine and have urged them to increase their understanding of the possible benefits and limitation of these approaches so that they can advise their patients appropriately (8). Others have stressed the need to incorporate the teaching of CAM into the curricula of medical schools and residency programs (9, 10). In fact, that call has been heard: in medical schools in the United States and Canada, as well as other countries, there is an increased presence of CAM in the curriculum (11). However, despite that close to 70% of U.S. medical schools include some aspect of CAM in their curricula, students and residents still consider their exposure insufficient to meet current needs regarding answering their patients' questions and appropriately referring them to reputable CAM practitioners (12, 13).

Recognizing the need to accelerate the development of innovative curricular models that incorporate CAM, the National Center for Complementary and Alternative Medicine (NCCAM) established a CAM Education Project Grant in 1999, which is currently funding initiatives in over 15 allopathic institutions, several of whom are partnering with CAM schools. The projects vary in scope, but most are developing and expanding approaches to integrate CAM

[1] To whom correspondence should be addressed at Department of Physiology and Biophysics, Georgetown University School of Medicine, 3900 Reservoir Road, N.W., Washington, DC 20057. E-mail: haramati@georgetown.edu

1535-3702/04/2298-0695 $15.00

information into medical, nursing, and allied health professional school curricula and into graduate and continuing medical education programs. This initiative by NCCAM should provide considerable momentum toward improving the level of awareness about CAM by the medical and other health professionals not only at the funded institutions, but in the broader community as well.

As the discussion of CAM therapies becomes part of the medical school curriculum, it is important to be sure that the material is presented with a balanced view of the proven benefits and potential dangers. Teaching about various CAM modalities and principles should be conducted objectively and consider the evidence available so that learners can begin to differentiate useful therapies from those that are useless and, more importantly, those with harmful interactions. Moreover, there is a real educational opportunity to use CAM approaches to teach students and residents the principles of evidence-based medicine and how to critically evaluate all therapeutic options. Faculty and students should foster a culture of open-minded skepticism (12).

In this regard, the article by Fugh-Berman and Myers (14), in the current issue of *Experimental Biology and Medicine*, demonstrates this principle. Their minireview helps shed light on the state of the evidence, or lack thereof, for the use of Seville orange (*Citrus aurantium*) extracts as a weight loss agent. Indeed, the authors provide a valuable service by alerting readers to the potential adverse effects of several active components of *C. aurantium*. What is also painfully clear is not only the need for more information, which can come from only further basic and clinical research, but also that the regulatory environment of botanical products warrants reconsideration for additional oversight (15).

The ever-growing interest in CAM presents important opportunities for the nation's research agenda. In an informative discussion of the challenges that are inherent in research on CAM, Berman and Straus (16) point out that most CAM therapies and products have entered clinical use without the prior demonstration of safety and efficacy. This represents fertile ground for careful investigation, and those in the field of experimental biology and medicine are well suited to tackle this formidable task.

There are other potential benefits to pursuing research on CAM. It is well recognized that many pharmaceutical products have their origins from plant extracts, where digitalis, quinine, opiates, and aspirin are but a few examples. The analysis and purification of today's herbal preparations may well yield tomorrow's single compound miracle drug. On the other hand, a number of CAM researchers believe that further investigations into herbal medicines may reveal that the efficacy of the few plant extracts proven to have therapeutic value will ultimately derive from the synergistic action of multiple interacting compounds, all of which may be present at relatively low concentrations. Such a finding could potentially be expanded to the study of any combination of therapeutic agents where each is used at doses that minimize side effects but enhance clinical outcome.

Other exciting developments continue to occur in the better understanding of physiological mechanisms by which acupuncture alleviates pain and nausea and how mind-body medicine techniques may improve the effectiveness of medications used for hypertension, diabetes, and psychological disorders. In some cases, the highly effective use of these skills may allow for the lowering of the dose of the medication needed. Rather than fearing the unknown regarding CAM, we can view CAM as opening an additional path to discovering new agents and modalities to address difficult-to-treat diseases. One example of this comes from the success of using the botanical, artemisinin. This plant extract has been shown to kill malarial parasites in half the time required by the currently accepted quinine protocol (17, 18). This notion may be extended to the search for other botanicals that can fill the void created by the ever-increasing resistance of infectious pathogens to existing antibiotics. These and other promising results may help propel the national research agenda in a highly productive and desirable direction.

1. Eisenberg DM, Kessler RC, Foster C, Norlock FE, Calkins DR, Delbanco TL. Unconventional medicine in the United States. Prevalence, costs, and patterns of use. N Engl J Med 328:246–252, 1993.
2. Borkan J, Neher JO, Anson O, Smoker B. Referrals for alternative therapies. J Fam Pract 39:545–550, 1994.
3. McLennan AH, Wilson DH, Taylor AW. Prevalence and cost of alternative medicine in Australia. Lancet 347:569–573, 1996.
4. Eisenberg DM, Davis RB, Ettner SL, Appel S, Wilkey S, Van Rompay M, Kessler RC. Trends in alternative medicine use in the United States, 1990-1997: results of a follow-up national survey. JAMA 280:1569–1575, 1998.
5. Sparber A, Wootton JC, Bauer L, Curt G, Eisenberg D, Levin T, Steinberg SM. Use of complementary medicine by adult patients participating in HIV/AIDS clinical trials. J Altern Complement Med 6:415–422, 2000.
6. Astin JA. Why patients use alternative medicine: results of a national study. JAMA 279:1548–1553, 1998.
7. Jonas WB. Alternative medicine—learning from the past, examining the present, and advancing to the future. JAMA 280:1616–1618, 1998.
8. Fontanarosa PB, Lundberg GD. Alternative medicine meets science. JAMA 280:1618–1619, 1998.
9. Cohen JJ. Reckoning with alternative medicine. Acad Med 75:571, 2000.
10. Berman BM. Complementary medicine and medical education. BMJ 322:121–122, 2001.
11. Wetzel MS, Eisenberg DM, Kaptchuk TJ. Courses involving complementary and alternative medicine at US medical schools. JAMA 280:784–787, 1998.
12. Wetzel MS, Kaptchuk TJ, Haramati A, Eisenberg DM. Complementary and alternative medicine: implications for medical education. Ann Intern Med 138:191–196, 2003.
13. Devries JM. Emerging educational needs of an emerging discipline. J Altern Complement Med 5:269–271, 1999.
14. Fugh-Berman A, Myers A. Citrus *aurantium*, an ingredient of dietary

supplements marketed for weight loss: current status of clinical and basic research. Exp Biol Med (in press).

15. Marcus DM, Grollman AP. Botanical medicines—the need for new regulations. N Engl J Med 347:2073–2076, 2002.
16. Berman JD, Straus SE. Implementing a research agenda for complementary and alternative medicine. Annu Rev Med 55:239–254, 2004.
17. Hien TT. An overview of the clinical use of artemisinin and its derivatives in the treatment of falciparum malaria in Vietnam. Trans R Soc Trop Med Hyg 88(Suppl 1):S7–S8, 1994.
18. Van Hensbroek MB, Onyiorah E, Jaffar S, Schneider G, Palmer A, Frenkel J, Enwere G, Forck S, Nusmeijer A, Bennett S, Greenwood B, Kwiatkowski D. A trial of artemether or quinine in children with cerebral malaria. N Engl J Med 335:69–75, 1996.