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security, one could reasonably defend it even if it violates the profession's code of ethics and is personally damaging to that individual. In a controversial psychobiography of President George W. Bush, Frank, a psychiatrist, characterized the president as a "paranoid megalomaniac" and "untreated alcoholic."<sup>14</sup> Although these are clearly clinical and diagnostic labels that appear to violate the Goldwater Rule, Frank's view is that his book is a scholarly psychobiography, not "expert opinion" and, as such, is outside the purview of APA ethics guideline.<sup>15</sup>

Still, the line between a careful psychiatric profile and a casual off-the-cuff diagnosis of a public figure is not so clear. Even if the intent of the mental health professional in both situations is very different—understanding the psychology of the person (psychobiography) or assailing the character of a disliked political candidate (the Goldwater case)—both share a similar ethical problem: unauthorized psychiatric assessment of a person who is not examined by the professional.

### Conclusion

Mental health professionals can play a valuable role in the discussion of public figures and their mental health. Their comments should be geared toward general information about mental illnesses and their treatments. Those professionals who offer their knowledge for public discourse should remember that their role is not to give an unsolicited or unauthorized professional opinion about an individual but to educate the public.

## Mindfulness in Medicine

David S. Ludwig, MD, PhD

Jon Kabat-Zinn, PhD

**M**INDFULNESS REFERS TO A MEDITATION PRACTICE that cultivates present moment awareness. In the past 30 years, interest in the therapeutic uses of mindfulness has increased, with more than 70 scientific articles on the topic published in 2007. Meditation practices, including mindfulness, have come to the attention of neuroscientists investigating consciousness and affect regulation through mental training and to psychotherapists interested in personal development and interpersonal relationships. In this Commentary, we define mindfulness, consider possible mechanisms, explore clinical applications, and identify challenges to the field.

### Mindfulness and Its Relationship to Medicine

Mindfulness involves attending to relevant aspects of experience in a nonjudgmental manner. Historically a Bud-

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dhist practice, mindfulness can be considered a universal human capacity proposed to foster clear thinking and open-heartedness. As such, this form of meditation requires no particular religious or cultural belief system. The goal of mindfulness is to maintain awareness moment by moment, disengaging oneself from strong attachment to beliefs, thoughts, or emotions, thereby developing a greater sense of emotional balance and well-being.

The original purpose of mindfulness in Buddhism—to alleviate suffering and cultivate compassion—suggests a potential role for this practice with medical patients and practitioners.<sup>1</sup> Much cardiovascular disease, diabetes, cancer, and other chronic illness is caused or exacerbated by modifiable lifestyle factors, and lifestyle modification constitutes primary or ancillary treatment for most medical condi-

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tions. An aim of mindfulness practice is to take greater responsibility for one's life choices. Thus, mindfulness may promote a more participatory medicine by engaging and strengthening an individual's internal resources for optimizing health in both prevention of and recovery from illness. For intractable disease, meditative techniques that alter and refine awareness may modulate the subjective experience of pain or improve the ability to cope with pain and disability.

Implicitly, at least, mindfulness has always been part of good medical practice, facilitating the physician's compassionate engagement with the patient. Epstein<sup>2</sup> suggests that "mindfulness is integral to the professional competence of physicians" in promoting effective clinical decision making and reducing medical errors. Indeed, the connection between medicine and meditation is underscored by their shared etymological origins in the Latin word *mederi*, which means "to heal."

### Mechanisms

There are many ways that mindfulness might influence susceptibility to, or ability to recover from, disability and disease. These may include (1) decreased perception of pain severity; (2) increased ability to tolerate pain or disability; (3) reduced stress, anxiety, or depression; (4) diminished usage of, and thereby reduced adverse effects from analgesic, anxiolytic, or antidepressant medication; (5) enhanced ability to reflect on choices regarding medical treatments (eg, decision to seek a second opinion); (6) improved adherence to medical treatments; (7) increased motivation for lifestyle changes involving diet, physical activity, smoking cessation, or other behaviors; (8) enriched interpersonal relationships and social connectedness; and (9) alterations in biological pathways affecting health, such as the autonomic nervous system, neuroendocrine function, and the immune system. Most of these possibilities have not been rigorously examined. Nevertheless, psychological stress has been linked to numerous medical conditions.

Moreover, preliminary data suggest that mindfulness practice has a profound and perhaps unique effect on brain function. In a study using functional magnetic resonance imaging in 27 undergraduate students in Los Angeles, California, Creswell et al<sup>3</sup> found that individual disposition toward mindfulness was associated with widespread prefrontal cortical activation and reduced bilateral amygdala activity during an affect-labeling task, after controlling for various psychometric covariates. Using electroencephalogram (EEG), Lutz et al<sup>4</sup> found that highly experienced Buddhist monks produced, during meditation, long-distance phase synchrony (suggestive of large-scale neural coordination) and gamma activity with a higher amplitude than any reported in a state of health. Davidson et al<sup>5</sup> randomly assigned participants in a corporate setting to a mindfulness-based stress reduction group or a wait list control group and reported increased left-sided anterior activation by EEG (patterns as-

sociated with positive emotional experience) in the stress reduction group. This group also demonstrated a greater increase in antibody titers to influenza vaccine, and the magnitude of the EEG change predicted the magnitude of antibody response. Tang et al<sup>6</sup> reported that undergraduates in a Chinese university randomly assigned to a mind/body intervention that included mindfulness showed lower salivary cortisol and higher salivary IgA concentrations in response to psychological stress (mental arithmetic task) compared with control students who were given an intervention of equal intensity that focused on relaxation. Thus, mindfulness training may be an effective way to positively regulate brain, endocrine, and immune function, influencing physiological and psychological variables important to well-being.

### Clinical Applications

Pain, stress, coping, and quality of life comprise the original focus of medical research into mindfulness. In 1982, Kabat-Zinn<sup>7</sup> reported descriptive data from medical patients with chronic pain of 6 months to 48 years' duration who received training in mindfulness-based stress reduction. Among the 51 participants who completed the program (88% of the 58 total enrolled), perceived pain decreased significantly during the intervention, with half reporting a reduction of at least 50%. In a study of 109 patients, aged 27 to 75 years, with various types of cancer, Speca et al<sup>8</sup> found that compared with a wait-list control group, those randomly assigned to the mindfulness group experienced improvements of 65% in mood disturbance and 31% in symptoms of stress. Others have found beneficial effects of mindfulness training on acceptance of pain, severity of general medical symptoms, physical functioning, and ability to cope with daily life.

Recently, a number of specific medical conditions have become the subject of study. Based on research involving individuals with a history of 3 or more episodes of major depression,<sup>9</sup> the National Health Service in the United Kingdom recommends mindfulness-based cognitive therapy. Mindfulness training has shown preliminary evidence of efficacy in the treatment of psoriasis, type 2 diabetes, sleep disturbance, attention-deficit hyperactivity disorder, and other conditions. Mindfulness, or lack thereof, may have special relevance for obesity and eating disorders. In one study, lean and obese young adults were given a meal of soup in special bowls that, unbeknownst to them, slowly refilled as their contents were consumed. These individuals ate 73% more than those who consumed soup from normal bowls. Of particular note, they did not believe they had consumed more, nor did they report being more satiated than the other participants.<sup>10</sup> Thus, mindfulness could inform not only the choice of what to eat but also the awareness of having eaten enough. In a pilot study, a small group of young women with bulimia nervosa reported a reduction in emotional and behavioral extremes and greater self-acceptance after mind-

fulness training.<sup>11</sup> The use of mindfulness training in pain, hypertension, myocardial ischemia, inflammatory bowel disease, human immunodeficiency virus, and substance abuse is presently under investigation in research supported by the National Institutes of Health (NIH).

Mindfulness training may also have applications in medical education and quality of care. Shapiro et al<sup>12</sup> reported that premedical and medical students randomly assigned to mindfulness training, compared with a wait-list control group, showed reduced psychological distress and increased empathy. Grepmaier et al,<sup>13</sup> in a randomized controlled trial, examined the course of 124 psychiatric inpatients treated by 18 psychotherapy interns. Patients of interns who had received mindfulness training did significantly better on measures of symptom severity compared with patients of interns who had not received this training. Mindfulness may also play a role in medical error reduction. Groopman<sup>14</sup> suggests that most misdiagnoses do not result from lack of knowledge but from faulty thinking, including anchoring errors (snap judgment), attribution errors (stereotyping), and other cognitive traps. He proposes that these cognitive errors can be avoided by paying attention to the process of thinking, a metacognitive practice of self-reflection akin to mindfulness.

### Limitations of Current Research

The available research on mindfulness has major limitations, precluding any definitive assessment of effectiveness at this time.<sup>15</sup> Published clinical studies frequently have small numbers of participants, lack an active control group, and include only subjective end points. Most of these studies do not adequately consider participant characteristics (making it difficult to generalize the effects to other groups), treatment methods (relating to reproducibility), study staff protocol adherence and participant skill acquisition (treatment fidelity), and relevant covariates (confounders and mediators). Moreover, the lack of consensus about working definitions of mindfulness and other meditative practices impedes comparative studies. These limitations, although not unusual in a nascent field, need to be addressed in future research.

### Conclusion

The current age has been referred to as one of "continuous partial attention." E-mail, cell phones, and other technol-

ogy invade nearly every moment of waking life. Economic pressures demand ever-increasing productivity, even as time to enjoy the fruits of labor declines. These factors adversely affect the health care system overall and diminish the patient-physician relationship. In this context, mindfulness may hold promise as a potential way to help prevent and treat disease, increase ability to cope with pain and chronic illness, reduce stress in patients and practitioners, foster compassion, improve quality of care and reduce medical errors. High-quality, mechanism-oriented studies and randomized controlled trials of mindfulness in medicine are needed.

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