# Mindfulness Meditation

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Mindfulness meditation and other mindfulness-based practices are gaining popularity due to a burgeoning evidence base supporting its benefits for a broad range of conditions and populations, including cancer patients[1] and healthcare professionals.[2,3] While this mind-body approach is rooted in Eastern religion and philosophy, namely Buddhism, which dates back well over 2,000 years, its integration into modern healthcare settings and society is relatively recent. The seminal launch of the mindfulness movement in the West was the establishment of the Stress Reduction Clinic and Mindfulness Based Stress Reduction (MBSR) program at the University of Massachusetts Medical Center by Jon Kabat-Zinn, PhD, in 1979. Today tens of thousands of people have been trained in MBSR and related mindfulness-based clinical interventions throughout the world, in every continent except Antarctica. Research in mindfulness meditation, not limited to MBSR, is also mounting. A recent search of the term 'mindfulness meditation' on PubMed.gov yielded more than 450 peer-reviewed journal articles. These studies elucidate mechanisms of how mindfulness meditation may work in the body and provide support for its effects on health and well-being.

Mindfulness involves intentionally bringing awareness to present-moment experience with an attitude of openness and curiosity. Shapiro and Carlson define it as "the awareness that arises through intentionally attending in an open, caring, and nonjudgmental way."[4] Mindfulness is essentially seeing and experiencing things as they are, using all senses while also being aware of thoughts, emotional tones, and reactions as they arise without judging them as good, bad, right, or wrong. It also includes catching oneself on "automatic pilot" and when one reflexively reacts, and noticing how those reactions manifest in the body. Mindfulness or this quality of being mindful is cultivated by mental training or practices such as mindfulness meditation.

There are two general styles of mindfulness meditation practice: focused attention and open monitoring.[5] Focused attention involves deliberately focusing attention on a neutral point of awareness, like the sensations and rhythm of breathing; whenever the mind starts to wander (which it inevitably will), one simply acknowledges that the mind has drifted off and then gently returns to a neutral focus (ie, the breath) and its associated sensory experience. Focusing attention in this way helps to settle the mind and reduce distractions. The second style of mindfulness meditation is open monitoring, also referred to as choiceless awareness. This practice is a more advanced practice that proceeds after stability of mind is attained through focused attention.[5] With open monitoring, one receptively notices whatever comes into one's field of awareness, which ultimately facilitates acuity of experience and recognition of mental and emotional habits (eg, automatic reactions, self-narratives).

## HOW DOES IT WORK?

Mindfulness meditation is a type of mental training. At the most fundamental level, it works because of neuroplasticity, which literally means that neurons (brain

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cells) are malleable. In essence the brain has the ability to change its structure and function depending on what neural circuitry is used. Mindfulness training has been shown to strengthen regions of the brain associated with attention and executive function,[6–9] interoception (ability to perceive internal body sensations),[10] and mental flexibility.[11] Mindfulness training has also been shown to attenuate activity in the amygdala (limbic area of brain associated with fear).[9] Of note, inattentiveness (or mindlessness) in everyday activities is associated with stress reactivity and chronic stimulation of this brain region.

From a psychological perspective, mindfulness meditation promotes affective balance and emotion regulation.[13] By minimizing extreme emotional lows and highs and lessening threat and stress perception, mindfulness training can impact a cascade of neuroendocrine and immune processes, including down-regulation of the sympathetic nervous system and the hypothalamic-pituitary-adrenal axis. As a result, decreased cardiovascular reactivity, lower levels of stress hormones and inflammatory markers, and improved immune function have been associated with mindfulness meditation training.[14,15]

## HOW ARE MINDFULNESS-BASED PRACTICES CURRENTLY USED?

The most common mindfulness training program in conventional clinical settings is MBSR or other similar programs modified for specific conditions, such as Mindfulness Based Cognitive Therapy to prevent depression relapse.[16] The typical MBSR program is delivered weekly in a group format over 8 weeks, covering approximately 20 hours of classroom training (didactic and experiential learning) and a 6-hour retreat (usually between weeks 6 and 7), as well as home meditation practice (recommended formal practice of 45 minutes daily, 6 days per week).[17] The core practices of the MBSR program include body scan (systematic awareness of different body sensations, generally done lying down), mindful movement (gentle Hatha yoga), and sitting meditation (which incorporates aspects of focused attention and open monitoring, described earlier in this article). Didactic content includes perception (and the impact of thoughts on the way one feels), stress physiology, and how to integrate mindfulness practices into everyday life.

In addition to MBSR, one can learn and practice mindfulness meditation in classes or "sitting groups" led by experienced teachers in the community, at hospitals or universities, or at Buddhist meditation centers. In some clinical settings, mindfulness practices are taught on an individual level and are designed to meet particular patient needs.[18] There are also innumerable books and guided meditation audio recordings available, although working with a teacher and having the support of other meditation practitioners is helpful.

**ONCE ONE LEARNS THE BASIC SKILLS** needed for mindfulness meditation, it can be practiced anywhere

MBSR and other introductory classes are simply an entry into mindfulness meditation. Sustained and maximum benefits occur with ongoing practice. Research clearly demonstrates a direct relationship between the amount of formal meditation practice and the magnitude of positive effects, as demonstrated by changes in brain structure[8] and function[9] and outcomes associated with sense of well-being.[19] The goal is to have mindfulness infuse one's way of being in and relating to the world in everyday life, which is developed and sustained through regular, ongoing meditation practice.

Mindfulness practices are accessible to anyone regardless of physical condition and are inexpensive to do. MBSR, meditation retreats, and introductory classes range in cost from free of charge (offered at some hospitals and centers) to hundreds of dollars. Once one learns the basic skills, mindfulness meditation can be practiced anywhere. Some people use meditation cushions and mats, though these are not essential. While mindfulness meditation is generally practiced in a seated position, it can be done lying down, which may be preferred by some cancer patients. It is important to be in a comfortable and stable position with minimal distractions and where one will not likely fall asleep. Also, informal practices, like mindful eating or walking, are options for deepening

skills and integrating mindfulness into one's life.

Here is a practical example of a cancer patient using mindfulness: a man in his 50s with a history of colorectal cancer who handles the experience of a new twinge differently before vs after mindfulness-meditation training. Before learning mindfulness, the man automatically reacted and went into a tailspin by creating a mental story about the pain; he interpreted it to mean that his cancer had recurred, and the rest of his life unpleasantly flashed in his mind. His body tensed up and contracted around the pain, which seemed to make his pain worse.

After learning mindfulness, he intentionally brought awareness to what he was experiencing. He noticed that his mind was racing and catastrophizing, that his heart was pounding, and his breathing was shallow. He re-centered himself by taking a deep breath and then gently focused on the sensations of breathing, one breath at a time. He felt more in control, relaxed, and grounded. He then recognized how irrational his thoughts were. He gradually brought his attention to the area of the pain; he noticed that the sensations, dull throbbing, were not constant. He was surprised and relieved; in that moment the sensation was not as uncomfortable or scary as he had thought.

**SYSTEMATIC REVIEWS** provide reasonably strong evidence supporting mindfulness meditation for cancer patients/survivors

## WHAT IS THE EVIDENCE RELATED TO MINDFULNESS MEDITATION FOR CANCER PATIENTS?

Systematic reviews[20–22] and a recent meta-analysis[1] provide reasonably strong evidence supporting the use of mindfulness meditation and related practices for cancer patients/survivors. The meta-analysis of 10 studies found large effects for mental health outcomes like anxiety, depression, stress, and distress (d = 0.48 overall, 0.35 randomized trials and 0.50 observational studies) and small effects for physical health variables such as immune function, blood pressure, and tumor markers (d = 0.18, no difference between randomized or observational studies).[1]

Several studies have been done exclusively with breast cancer survivors.[23–27] One single-arm pre–post design study demonstrated less stress, hopelessness, and anxious preoccupation about cancer, and greater internal locus control after MBSR training.[23] In a similar study, Matousek and Dobkin identified significant reductions in self-reported stress, medical symptoms, and depression, and improvements in sense of coherence post intervention.[24] Lengacher and colleagues, in a randomized controlled trial comparing a 6-week MBSR program to usual care, found statistically significant differences with lower depression, anxiety, and fear of recurrence, and higher energy and physical functioning in those who participated in the mindfulness training.[25] Witek-Janusek et al found improvements in biological measures (specifically cortisol, natural killer cell cytotoxicity, gamma interferon, IL-4, IL-6, and IL-10) as well as in quality of life and optimistic coping in early-stage breast cancer patients who self-selected participation in MBSR, compared with those who did not.[26]

Carlson, Speca, and colleagues have conducted a number of studies evaluating MBSR for cancer patients.[28–34] In their first study, patients with mixed cancer diagnoses who participated in mindfulness training had lower mood disturbance and symptoms of stress at post-intervention[28] and 6 months later.[29] Subsequent work by the same group with early-stage breast and prostate cancer patients revealed improvements in quality of life, symptoms of stress, and sleep quality, as well as trends toward improvements in neuroendocrine and immune measures post-intervention,[30,31] with sustained effects at 1-year follow-up.[32]

Other studies have explored innovative approaches of delivering mindfulness interventions to cancer patients. In a randomized controlled trial, Monti and colleagues found that Mindfulness Based Art Therapy lowered psychological distress and improved quality of life for women with cancer.[35] Loizzo et al found similar findings along with trends in improvements in biological stress measures (morning salivary cortisol and resting heart rate), but no change in IL-6, natural killer cells, or cortisol diurnal rhythm, in early-stage breast and gynecologic cancer survivors who partici-

pated in a 20-week meditation-based self-care intervention.[36] A dietary intervention (high vegetable protein and nutrients, low animal fat) combined with MBSR was found to slow prostate specific antigen (PSA) growth in men with prostate cancer.[37] Specifically, the PSA doubling time for the men in the MBSR plus nutrition group was nearly threefold longer after the intervention compared to controls; PSA doubling time is an indicator of risk of recurrence and disease progression. Other studies have explored and demonstrated feasibility and promising findings of individual mindfulness training for cancer patients undergoing hematopoietic stem cell transplant.[18,38]

## WHAT ARE THE POTENTIAL RISKS?

Mindfulness meditation is very safe and has few associated risks. Sometimes people may experience a transient increase in anxiety when learning it, as they let go of usual busyness and distractions and become aware of unsettling thoughts and feelings. Advanced meditation practitioners who engage in long and intensive meditation (hours per day and months at a time) have added risks and need to work closely with an experienced teacher during such intense training periods.

## WHAT IS THE BOTTOM-LINE MESSAGE?

Mindfulness meditation and mindfulness-based clinical interventions are low-cost and low-risk mind-body practices that have been shown to positively affect quality of life and biological outcomes in many different populations, including cancer patients and healthcare professionals.

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