

A Buddhist philosophical framework for understanding the experience of cancer and radiotherapy

Abstract

This article explores the intersection of Buddhist philosophy and the experience of cancer, particularly in the context of radiotherapy. From a Buddhist perspective, cancer, like all phenomena, is understood as impermanent and arising from a complex interplay of causes and conditions. This perspective emphasizes acceptance of impermanence and the cultivation of equanimity to alleviate suffering associated with illness. The doctrine of interdependence highlights the interconnectedness of physical, mental, and emotional well-being, encouraging a holistic approach to health. Mindfulness meditation is presented as a valuable tool for managing stress, anxiety, and potentially influencing physiological processes like inflammation and immune function. The article also explores the Buddhist concepts of compassion, both for oneself and others, and wisdom as essential elements in the healing process. Furthermore, the principle of *hendoku iyaku* (Japanese for “changing poison into medicine”) is introduced as a metaphorical framework for understanding radiotherapy, where a harmful agent (radiation) is utilized for therapeutic benefit. The practice of Nichiren Shoshu Buddhism, centered on chanting Nam-Myoho-Renge-Kyo, is discussed, referencing previous research by the author suggesting potential effects on brain activity, microbial metabolism, and non-local influences. Finally, the article speculates on potential links between the 116 Hz frequency generated during chanting and chloride ion movements, hypothesizing possible implications for cellular responses to radiation and mitigation of treatment side effects. While acknowledging the need for further scientific investigation, the article proposes that Buddhist principles and practices can offer valuable complementary support for patients undergoing radiotherapy, promoting peace, resilience, and hope. It is important to understand, however, that the practice of Nichiren Shoshu Buddhism, particularly the chanting of Nam-Myoho-Renge-Kyo, is a multifaceted experience that includes both observable physiological effects and a subjective spiritual dimension. While scientific methods can investigate the former, the latter transcends purely empirical explanation.

Keywords: Buddhism, cancer, radiation, radiotherapy, sound frequencies

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Marco Ruggiero

National Coalition of Independent Scholars, USA

Correspondence: Marco Ruggiero, MD, PhD, National Coalition of Independent Scholars, 125 Putney Rd Battleboro, VT 05301, United States of America, Email marco.ruggiero@ncis.org

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Introduction

Buddhism, one of the world’s major religions, is practiced by approximately 500 million people globally, constituting around 6.6% of the world’s population. China boasts the largest Buddhist population, with an estimated 254 million followers, followed by Thailand (66 million), Myanmar (41 million), and Japan.¹ In the United States approximately 1.2 million people practice Buddhism. Buddhism is prevalent also in Italy, with around 160,000 practitioners representing about 0.3% of the population; it is the third most widespread religion after Christianity and Islam.² Interestingly, Nichiren Daishonin’s Buddhism is the most represented school of Buddhism in Italy. This is a school of Buddhism that emphasizes the teachings of Nichiren Daishonin, a 13th-century Japanese Buddhist priest. The core practice revolves around chanting Nam-Myoho-Renge-Kyo to the Object of Worship called Gohonzon. Within Nichiren Shoshu, the orthodox school of Nichiren Daishonin’s Buddhism, the Gohonzon is understood to represent the fusion of the ultimate Law of the Universe, expressed as Nam-Myoho-Renge-Kyo, and the enlightened life state attained by Nichiren Daishonin, the True Buddha. In Nichiren Shoshu, the Dai-Gohonzon, enshrined at the Head Temple Taisekiji in Japan, is considered the ultimate Gohonzon for all humanity. Chanting Nam-Myoho-Renge-Kyo is the primary practice. Nam-Myoho-Renge-Kyo is a phrase that expresses devotion to the Mystic Law of the Lotus Sutra.³ (Figure-1)

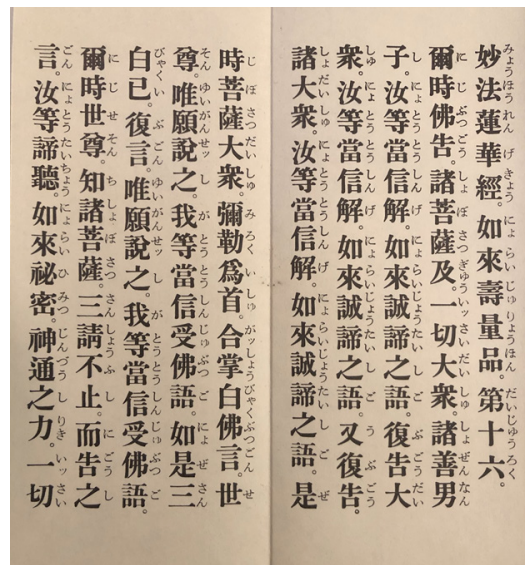


Figure 1 A Nichiren Shoshu sutra book of the 16th Chapter (Juryo - Lifespan) of the Lotus Sutra. Within the Juryo Chapter of the Lotus Sutra, the Buddha hid the essential Law of Myoho-Renge-Kyo, the vital entity that allows all people to become Buddhas. Image scanned from the author’s personal collection.

Chanting is believed to activate one's inherent Buddha nature, bringing forth wisdom, courage, and compassion. It is typically done facing the Gohonzon. Nichiren Shoshu emphasizes both personal practice and sharing the teachings with others. Sharing Buddhism is seen as an act of compassion and a way to help others connect with their own potential for enlightenment. Here, the author, a radiologist and a long-term Buddhist practitioner introduced to Nichiren Shoshu Buddhism in 1979 in Italy, elaborates on the potential relationships between Buddhism, cancer, and radiotherapy.

Cancer from the perspective of Buddhism

From a Buddhist perspective, cancer, a disease marked by the uncontrolled growth of abnormal cells, like all phenomena, is inherently impermanent and arises from a complex interplay of causes and conditions. This article will explore the Buddhist understanding of cancer, its implications for those afflicted, and the potential role of Buddhist practices in alleviating suffering and fostering a sense of peace.

Impermanence and the nature of suffering: the connection between the Buddhist doctrine of impermanence and the experience of cancer

The core teaching of impermanence in Buddhism isn't just a philosophical concept; it's a fundamental observation about the nature of reality. It states that everything that exists is in a constant state of flux. Nothing remains static. This applies not only to physical objects and living beings but also to our thoughts, feelings, and experiences. From the smallest subatomic particles to the largest galaxies, everything is subject to change, arising and passing away in a continuous cycle.

This principle directly relates to the human experience of aging, sickness, and death. Our bodies are not fixed entities; they are constantly changing, with cells regenerating and decaying. This inherent changeability means that health is not a permanent state. Illness, including diseases like cancer, is therefore not an aberration or an unfair intrusion, but rather a natural consequence of this universal impermanence. Cancer, in this context, becomes a particularly potent reminder of our mortality – the inevitable end that awaits all living beings. It forces us to confront the reality that our physical form is temporary and subject to decay and dissolution. Cancer, a complex disease encompassing over 200 identified types (a number that continues to evolve as research progresses), presents a significant global health challenge. According to the Centers for Disease Control and Prevention (CDC) in the United States, the cancer mortality rate is approximately 146 deaths per 100,000 people annually. Globally, a very rough estimate of the global cancer mortality rate falls within the range of 1-2% of the global population per year. The specific types of cancer can vary greatly in terms of their characteristics, causes, and treatment options.

However, the Buddhist perspective on impermanence is not intended to induce despair or nihilism. Instead, it offers a path to liberation from suffering. By deeply understanding and accepting the impermanent nature of all things, including our own bodies and lives, we can begin to loosen the grip of attachment. Attachment to a fixed sense of self, to our health, to our possessions, and even to life itself, is identified in Buddhism as a primary source of suffering. When we cling to the illusion of permanence, we set ourselves up for disappointment, pain, and grief when things inevitably change.

The experience of a serious illness like cancer can trigger intense fear and anxiety. Fear of pain, suffering, loss of control, and ultimately, death. The Buddhist approach suggests that much of this suffering

arises from our resistance to the reality of impermanence. We resist the idea that our bodies can become sick, that our lives are finite. By cultivating acceptance of this reality, we can begin to alleviate this suffering. Acceptance, in this context, doesn't mean resignation or passivity. It means acknowledging the reality of the situation without resistance or denial.

This acceptance allows us to cultivate equanimity. Equanimity is a state of mental calmness and composure, even in the face of adversity. It is the ability to maintain balance and stability of mind, without being swayed by strong emotions like fear, anger, or grief. When we understand that change is the only constant, we can face challenges like illness with greater clarity and resilience. We can focus on what we can control - our thoughts, our actions, and our responses - rather than being overwhelmed by the uncontrollable nature of the disease itself. Equanimity arises from a combination of practices. Mindfulness, through meditation and mindful living, cultivates present moment awareness. Self-compassion involves acknowledging imperfections without judgment and treating oneself with kindness. Wisdom emerges from understanding impermanence and recognizing the interconnectedness of all beings. By cultivating these qualities, one can develop a greater sense of inner peace and equanimity. This involves observing thoughts without judgment, acknowledging imperfections with kindness, and understanding the interconnectedness of all things.

In short, the Buddhist doctrine of impermanence provides a framework for understanding the nature of reality and offers a path to navigate the challenges of life, including serious illness. By accepting the impermanent nature of all things, we can reduce our suffering, cultivate equanimity, and find peace even in the face of mortality. It encourages us to live more fully in the present moment, appreciating the preciousness of each fleeting experience, rather than clinging to the illusion of permanence.

Interconnectedness and the root of suffering: the Buddhist concept of interdependence and its relation to suffering, particularly in the context of health and illness like cancer.

The doctrine of interdependence, often translated as "dependent origination" or "conditioned arising," is a cornerstone of Buddhist philosophy. It essentially states that nothing exists in isolation. Every phenomenon, every event, every experience arises in dependence upon a multitude of other factors. Nothing is self-existent or independent; everything is interconnected in a vast web of cause and effect. This principle challenges the notion of independent, permanent entities or selves.

The Sanskrit term for interdependence, *pratītyasamutpāda*, is a compound word: *pratītya* meaning "depending on" or "because of," and *samutpāda* meaning "arising" or "coming into existence." It vividly describes the interconnected and conditional nature of reality. It's not simply a linear cause-and-effect relationship, but a complex network of interacting conditions that give rise to every phenomenon.

Applying this to the context of cancer, we see that it's not simply a random occurrence or an isolated event within the body. Instead, its development is understood as the result of a complex interplay of numerous factors.⁴ These factors can include:

Genetic predisposition: Inherited genetic mutations can increase an individual's susceptibility to certain types of cancer. This is one condition within the web of causation.

Environmental influences: Exposure to carcinogens in the environment, such as pollution, radiation, or certain chemicals, can

contribute to the development of cancer. This is another contributing factor.

Lifestyle choices: Lifestyle choices significantly influence cancer risk. While a balanced diet, regular physical activity, and moderate alcohol consumption can contribute to cancer prevention, smoking stands out as the single most preventable cause. Smoking dramatically increases the risk of numerous cancers, including lung, throat, mouth, bladder, and kidney, due to the thousands of harmful carcinogens in tobacco smoke. These lifestyle choices, along with genetic predisposition and environmental factors, create a complex interplay that can promote or mitigate the development of cancer.

It's crucial to understand that these factors don't operate in isolation. They interact and influence each other. For example, a genetic predisposition might only manifest as cancer if combined with certain environmental exposures or lifestyle choices. This intricate interplay highlights the profound interconnectedness of all things.

Beyond the physical and biological aspects, the Buddhist perspective also emphasizes the role of our mental and emotional states in our overall well-being. Our thoughts, emotions, and actions are not separate from our physical health; they are integral parts of the same interconnected system. Chronic stress, negative emotions, and unskillful actions can weaken the body's resilience and contribute to various health problems, including potentially influencing the development or progression of diseases like cancer.

Understanding interdependence has profound implications for how we approach health and well-being. It encourages us to take a holistic view, recognizing that our physical, mental, and emotional states are intimately connected and influenced by a multitude of factors. It also highlights the importance of personal responsibility in making choices that promote health and well-being. By cultivating positive mental states, engaging in healthy behaviors, and fostering harmonious relationships, we contribute to a network of conditions that support health and resilience.

Furthermore, the concept of interdependence helps us to move beyond blame and judgment. When facing a health challenge like cancer, it's easy to fall into self-blame or to look for someone or something to blame. However, understanding that the condition arises from a complex web of interconnected factors can foster a sense of compassion and acceptance, both for ourselves and others.

In essence, the doctrine of interdependence teaches us that we are all part of a vast and intricate network of relationships. Recognizing this interconnectedness can lead to a deeper understanding of the nature of reality and a more compassionate and responsible way of living, contributing not only to our own well-being but also to the well-being of the world around us.

The role of mindfulness and meditation

Mindfulness meditation, rooted in Buddhist practice, involves intentionally focusing one's attention on the present moment without judgment. It's about observing thoughts, feelings, and bodily sensations as they arise, without getting carried away by them or trying to suppress them. This cultivates a non-reactive awareness, allowing us to experience reality more directly and with greater clarity.

In the context of cancer, mindfulness meditation can be a particularly valuable tool for managing the wide range of challenges associated with the disease and its treatment. These challenges often include physical symptoms, emotional distress, and existential concerns.

One of the key benefits of mindfulness meditation is its ability to reduce stress, anxiety, and depression. These emotional burdens are common among individuals facing a cancer diagnosis and treatment. The uncertainty, fear, and physical discomfort can create a significant amount of psychological distress. Mindfulness practice helps to interrupt the cycle of rumination and worry that often fuels anxiety and depression. By focusing on the present moment - the breath, bodily sensations, or sounds—individuals can gently redirect their attention away from distressing thoughts about the past or future. This cultivates a sense of presence and groundedness, reducing the intensity of negative emotions.

Furthermore, the non-judgmental aspect of mindfulness is crucial. Often, we add layers of suffering by judging our thoughts and feelings. For example, someone experiencing pain might also feel frustrated or angry about having the pain. Mindfulness encourages us to simply observe these experiences without judgment, acknowledging them without getting caught up in them. This can significantly reduce the emotional suffering associated with physical symptoms.

Beyond the psychological benefits, there is growing evidence suggesting that mindfulness meditation can also have positive effects on physical health. Studies have indicated that mindfulness practices can:

Promote relaxation: Mindfulness activates the parasympathetic nervous system, which is responsible for the "rest and digest" response. This can lead to a decrease in heart rate, blood pressure, and muscle tension, promoting a state of relaxation and reducing the physiological effects of stress.⁵

Reduce inflammation: Chronic inflammation has been linked to a variety of health problems, including cancer. Some research suggests that mindfulness meditation can help to regulate the inflammatory response in the body, potentially contributing to improved physical health.⁶ Mitigating chronic inflammation requires a holistic approach encompassing dietary adjustments, lifestyle modifications, and stress management. Prioritizing a diet rich in anti-inflammatory foods, such as fruits, vegetables, whole grains, and lean proteins, while minimizing processed foods and sugary drinks is paramount. Regular physical activity, including activities like brisk walking, cycling, or meditation, not only enhances cardiovascular health but also plays a crucial role in combating inflammation.

Furthermore, incorporating stress management techniques such as mindfulness meditation, deep breathing exercises, and ensuring sufficient sleep are essential components of an anti-inflammatory lifestyle. By cultivating a healthy lifestyle and addressing underlying conditions that may contribute to chronic inflammation, individuals can effectively mitigate its impact and improve their overall well-being.

Boost the immune system: While more research is needed, preliminary studies indicate that mindfulness practices may have a positive impact on immune function. By reducing stress hormones like cortisol, which can suppress the immune system, mindfulness may indirectly support the body's natural defenses.⁷

It's important to note that mindfulness meditation is not a cure for cancer; however, it can be a powerful complementary approach that supports overall well-being and enhances coping abilities. By cultivating present-moment awareness, individuals can learn to manage their physical and emotional symptoms more effectively, improve their quality of life, and find a greater sense of peace and acceptance in the face of challenging circumstances. It empowers

individuals to respond to their experiences with greater awareness and resilience, rather than simply reacting to them.

In short, mindfulness meditation offers a valuable set of tools for individuals navigating the challenges of cancer. By cultivating present-moment awareness and non-judgmental observation, individuals can reduce stress, anxiety, and depression, potentially enhance physical well-being, and cultivate a greater sense of inner peace.

The path to healing: compassion and wisdom

From a Buddhist standpoint, healing is not solely about the eradication of physical symptoms; it encompasses a holistic approach that addresses the interconnectedness of mind, body, and spirit. A crucial element of this healing process is the cultivation of compassion, both for oneself and for others.

Compassion: Compassion, in the Buddhist context, is not simply pity or sympathy. It is a deep empathy for the suffering of others, combined with a sincere wish to alleviate that suffering. It begins with recognizing the shared human experience of vulnerability and imperfection. We all experience pain, loss, and hardship at some point in our lives. This shared experience forms the basis for connection and empathy.

Self-compassion: This is a vital aspect often overlooked. Self-compassion involves extending the same kindness, understanding, and acceptance to ourselves that we would offer to a dear friend who is struggling. It means acknowledging our own imperfections and limitations without harsh self-criticism or judgment. During challenging times, such as facing a serious illness like cancer, self-compassion is especially important. It allows us to be gentle with ourselves, to acknowledge our pain and fear without adding layers of self-blame or shame. It involves recognizing that suffering is a part of the human condition, not a personal failing.

Compassion for others: Extending compassion outward involves recognizing the suffering of others and actively seeking ways to alleviate it. This can involve offering practical support, emotional comfort, or simply being present with others in their pain. In the context of cancer, this might involve supporting other patients, caregivers, or healthcare professionals. By connecting with the shared human experience of suffering, we cultivate a sense of interconnectedness and reduce feelings of isolation.

Wisdom: In Buddhism, wisdom is not merely intellectual knowledge; it is a deep understanding of the true nature of reality. It involves seeing things as they truly are, beyond the veils of illusion and delusion. This understanding is crucial for navigating the challenges of illness.

Understanding Impermanence and Interdependence: As discussed previously, understanding the impermanent and interconnected nature of all things is a key aspect of Buddhist wisdom. This understanding can help us to accept the changing nature of our health, to let go of unrealistic expectations, and to appreciate the preciousness of each moment.

Equanimity: Wisdom cultivates equanimity, a state of mental calmness and composure in the face of adversity. It allows us to maintain balance and stability of mind, even when experiencing difficult emotions or physical sensations. Equanimity is not indifference; it is a balanced and clear-minded approach to life's challenges, allowing us to respond with wisdom and compassion rather than reactivity and fear.

Informed decision-making: Wisdom also plays a crucial role in making informed decisions about treatment options. By approaching

decisions with clarity and discernment, we can choose the path that aligns best with our values and needs.

Finding meaning: Even in the face of serious illness, wisdom can help us to find meaning and purpose. By reflecting on our experiences and connecting with our deepest values, we can discover new insights and perspectives that can enrich our lives.

Buddhism offers a framework for understanding and coping with the challenges of cancer. It does not offer a medical cure in a literal sense, but it provides invaluable tools for navigating the emotional, psychological, and spiritual aspects of the disease. By embracing the principles of impermanence, interdependence, mindfulness, compassion, and wisdom, individuals can cultivate a sense of peace, resilience, and hope, even in the midst of suffering. It encourages a shift in perspective, from focusing solely on the disease to embracing a more holistic approach to healing that encompasses the entire human experience.

Radiation therapy from the perspective of Buddhism

Hendoku iyaku: a metaphorical lens for understanding radiation therapy

The Buddhist principle of *hendoku iyaku* (変毒為薬) is a core concept, particularly within Nichiren Daishonin's Buddhism. It translates to "changing poison into medicine". The principle of *hendoku iyaku* suggests that even the most negative experiences or seemingly harmful substances can be transformed into something beneficial. This concept offers a powerful lens through which to view the experience of radiation therapy.

Radiation therapy encompasses a variety of techniques to deliver radiation to cancerous tissues. External beam radiation therapy utilizes external sources to direct high-energy radiation beams at the tumor. This includes modalities such as 3D conformal radiation therapy and intensity-modulated radiation therapy, which allow for precise targeting of the tumor while minimizing damage to surrounding healthy tissues. In contrast, internal radiation therapy (brachytherapy) involves the placement of radioactive material directly within or near the tumor. Systemic radiation therapy, on the other hand, utilizes radioactive drugs administered intravenously to distribute radiation throughout the body.

Whatever the technique used, radiation therapy, is inherently damaging. It uses high-energy radiation to target and kill cancer cells, but in doing so, it also affects healthy tissues. This can lead to a range of side effects, from skin irritation and fatigue to more serious complications.⁸ In this sense, radiation can be seen as a "poison" - a harmful agent introduced into the body.

However, the purpose of this "poison" is therapeutic. Radiation therapy exerts its therapeutic effect by inducing DNA damage in cancer cells. This damage can manifest in various forms, including single-strand breaks, double-strand breaks, and oxidative damage. Understanding the mechanisms of DNA damage induced by radiation is crucial for optimizing treatment strategies while minimizing side effects. By damaging the DNA of cancer cells, radiation therapy can prevent them from growing and multiplying, ultimately leading to tumor shrinkage or elimination. Thus, the "poison" is transformed into "medicine" - a means of healing and potentially saving lives.

This transformation is not automatic. It requires careful planning and execution by medical professionals, as well as the patient's own

resilience and ability to cope with the treatment's side effects. Here's where the Buddhist perspective can be particularly helpful:

- i. **Accepting impermanence and interdependence:** As discussed above, understanding that all phenomena are impermanent can help patients accept the temporary nature of the side effects. By recognizing that these effects are not permanent, they can develop a greater sense of equanimity and reduce their suffering.
 - Moreover, recognizing that the radiation interacts with the body in a complex web of cause and effect can foster a more holistic understanding of the treatment process. It acknowledges that the radiation affects not only the cancer cells but also the entire system, highlighting the importance of supporting overall wellbeing during treatment.
- ii. **Cultivating mindfulness and compassion:** Mindfulness practices, such as meditation and mindful breathing, can help patients manage the physical and emotional challenges of radiation therapy.⁹ By focusing on the present moment, they can observe their sensations and emotions without judgment, reducing anxiety and improving their ability to cope with pain and discomfort.
 - Cultivating compassion, both for oneself and others, is essential. Self-compassion allows patients to be gentle with themselves during this difficult time, acknowledging their pain and limitations without self-criticism. Compassion for others, including healthcare providers and fellow patients, fosters a sense of connection and reduces feelings of isolation.
- iii. **Wisdom and finding meaning:** Developing wisdom involves understanding the nature of suffering and finding meaning even in difficult experiences. Radiation therapy, while challenging, can be seen as an opportunity for growth and self-discovery. By facing these challenges with courage and acceptance, patients can develop greater resilience and a deeper appreciation for life.

The Buddhist concept of *hendoku iyaku* can provide a valuable metaphorical framework for understanding the experience of radiation therapy. By embracing Buddhist principles such as impermanence, interdependence, mindfulness, compassion, and wisdom, patients can find greater meaning and support during their treatment journey, transforming a potentially harmful experience into a path towards healing and wellbeing.

The chanting of Nam-Myoho-Renge-Kyo in the context of cancer and radiation therapy

The potential intersection of chanting Nam-Myoho-Renge-Kyo, as investigated in a recent article³ and the context of radiotherapy in cancer treatment warrants exploration. While direct causal links necessitate further rigorous scientific investigation, certain findings suggest potential avenues for complementary support in oncology.

This research³ highlights several key aspects of chanting: modulation of brainwave activity, potential influence on microbial metabolism, and the concept of non-local effects. These findings offer a framework for considering the potential role of chanting in the context of radiotherapy.

Mitigation of treatment-related stress and anxiety: Radiotherapy, while a crucial therapeutic modality, is frequently associated with significant psychological distress. The treatment process itself, coupled with the inherent uncertainty of oncological prognoses, can precipitate anxiety, fear, and diminished quality of life. Observations

regarding the potential of chanting to induce states of relaxation and focused attention,³ suggest a potential for mitigating these adverse psychological effects. It is conceivable that the practice of chanting could serve as a complementary intervention to enhance coping mechanisms and improve patient well-being during the course of radiotherapy.

Potential modulation of immunological function: The administration of radiotherapy can, in some instances, induce immunosuppression, rendering patients more vulnerable to opportunistic infections. Investigation into the influence of chanting on microbial metabolism³ raises the possibility of a concomitant modulation of immune function. Although further research is imperative to substantiate this hypothesis, it presents a compelling area for future inquiry. It is plausible that chanting, through its influence on microbial communities, could contribute to the maintenance of immunological resilience during radiotherapy.

Consideration of non-local effects in oncological support: The concept of non-local effects,³ introduces a novel perspective on the potential influence of chanting. While the scientific mechanisms underlying such effects remain largely unexplored, the possibility of influence extending beyond direct physical interaction merits consideration. Within the context of cancer treatment, this concept raises intriguing questions regarding the potential for chanting, performed by support networks or caregivers, to provide a form of emotional or energetic support to patients undergoing radiotherapy, even in the absence of physical proximity. This, however, remains highly speculative and demands rigorous investigation.

The interplay of sound, ions, and radiations

Research highlighting the 116 Hz frequency generated during chanting Nam-Myoho-Renge-Kyo and its potential influence on chloride ion movements^{3,10-12} introduces an intriguing perspective. Chloride ions play a crucial role in maintaining cellular homeostasis, particularly in regulating membrane potential and inhibitory neurotransmission via GABA receptors. These functions are relevant to both neuronal and non-neuronal cell behavior, including potentially influencing cellular responses to radiation.

Hypothesized mechanisms of interaction

- i. **Modulation of cellular excitability:** Radiation therapy induces cellular stress and can disrupt ion homeostasis. It is hypothesized that the 116 Hz frequency, by influencing chloride ion flux across cell membranes, could modulate cellular excitability and potentially alter cellular responses to radiation. Specifically, changes in chloride ion concentrations could affect the sensitivity of cells to radiation-induced DNA damage. This could potentially lead to increased radiosensitivity of cancer cells or enhanced radioresistance of normal cells, depending on the specific context and cellular environment.
- ii. **Influence on GABAergic signaling:** GABA, the primary inhibitory neurotransmitter in the central nervous system, relies on chloride ion gradients to exert its inhibitory effects. Radiotherapy can induce neuroinflammation and disrupt neurotransmitter signaling, contributing to side effects such as cognitive dysfunction and fatigue. It is conceivable that the 116 Hz frequency, by influencing chloride ion movements, could modulate GABAergic signaling and potentially mitigate some of these neurological side effects. This could lead to improved patient comfort and quality of life during and after radiotherapy.

iii. Impact on tumor microenvironment: The tumor microenvironment is a complex ecosystem of cells, including cancer cells, immune cells, and stromal cells. Chloride ions play a role in regulating the pH and ionic composition of this microenvironment, which can influence tumor growth and response to therapy. It is hypothesized that the 116 Hz frequency, by influencing chloride ion movements, could modulate the tumor microenvironment and potentially enhance the efficacy of radiotherapy. For example, changes in chloride ion concentrations could affect tumor cell metabolism, angiogenesis, and immune cell infiltration, all of which can influence the response to radiation.

iv. Potential for selective targeting: A key challenge in radiotherapy is achieving selective targeting of cancer cells while sparing healthy tissues. It is highly speculative, but theoretically possible, that specific sound frequencies, perhaps in combination with other modalities, could be used to selectively modulate chloride ion movements in cancer cells, making them more susceptible to radiation damage. This could potentially lead to more targeted and effective radiotherapy with reduced side effects.

While highly speculative, the potential interplay between the 116 Hz frequency generated during chanting, chloride ion movements, and radiotherapy presents an intriguing area for future research. By exploring these potential connections, we may gain new insights into the mechanisms of radiation therapy and potentially develop novel strategies to enhance its efficacy and reduce side effects.

In particular, based on the hypothesized mechanisms of interaction mentioned above, future research should focus on:

- i. Investigating the direct effects of 116 Hz sound waves on chloride ion channels and cellular function *in vitro* and *in vivo*.
- ii. Exploring the potential of combining sound frequency stimulation with radiotherapy in preclinical and clinical studies.
- iii. Investigating the effects of chanting on the tumor microenvironment and immune response in cancer patients undergoing radiotherapy.

Crucial caveats and future directions: It is essential to emphasize that the aforementioned connections are presented as potential areas for future research and should not be construed as definitive scientific conclusions. Further rigorous investigation, employing well-designed clinical trials and robust methodologies, is necessary to establish causal relationships between chanting, radiotherapy outcomes, and the broader context of cancer treatment. Furthermore, the findings pertaining to chanting should not be interpreted as a replacement for established medical interventions, including radiotherapy. Rather, the practice of chanting should be considered within the framework of integrative oncology, as a potential complementary approach to enhance patient well-being and support conventional treatment modalities.

Finally, it is crucial to acknowledge the inherent limitations of applying purely scientific methodologies to the subjective experience of chanting and its associated spiritual significance. While scientific inquiry can elucidate certain physiological and psychological effects, the full impact of chanting Nam-Myoho-Renge-Kyo and practicing Nichiren Shoshu Buddhism transcend the realm of empirical measurement.

In conclusion, the most recent observations on the effects associated with the practice of Nichiren Shoshu Buddhism³ offer

intriguing possibilities for integrating the practice of chanting within a holistic approach to cancer care. By potentially mitigating stress, modulating immune function, and fostering a sense of connection and hope, chanting may contribute to improved patient outcomes and enhanced quality of life during the challenging experience of radiotherapy. (Figure-2)



Figure 2 Memorial monument honoring Nichiren Daishonin (center), with the memorials of the Second High Priest Nikko Shonin and the Third High Priest Nichimoku Shonin positioned to the right and left, respectively, relative to the central monument. Photograph taken by the author in the mid-1980s at Taisekiji Head Temple.

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Conflicts of interest

The author declares no conflict of interest in regard to the specific topics treated in this study.

Ethics

This article is original and contains material that has not been submitted or published in any preprint server or scientific journal.

Ethical approval

Not applicable.

Consent to participate

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Advisory

No information in this paper is intended or implied to be a substitute for professional medical advice, diagnosis or treatment.

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