

Neurobiology of Chakras and Prayer

with Richard W. Maxwell, "The Physiological Foundation of Yoga Chakra Expression";
and Ruth Stanley, "Types of Prayer, Heart Rate Variability, and Innate Healing"

TYPES OF PRAYER, HEART RATE VARIABILITY, AND INNATE HEALING

by Ruth Stanley

Abstract. Spiritual practices such as prayer have been shown to improve health and quality of life for those facing chronic or terminal illness. The early Christian healing tradition distinguished between types of prayer and their role in healing, placing great emphasis on the healing power of more integrated relational forms of prayer such as prayers of gratitude and contemplative prayer. Because autonomic tone is impaired in most disease states, autonomic homeostasis may provide insight into the healing effects of prayer. I report on observations in five volunteers engaging in five types of prayer. Using heart rate variability as a measure of autonomic tone and adaptability, I review the potential correlation of type of prayer with autonomic rebalance as measured specifically by psychophysiological coherence ratios. The five types—supplication, devotion, intercession, gratefulness, and contemplative prayer—elicited varying degrees of improvements in heart rate variability and corresponding psychophysiological coherence. These observations suggest a correlation of innate healing to prayer type that is consistent with teachings from the Christian healing tradition and with modern research. Further research is warranted to verify these hypotheses.

Keywords: autonomic nervous system; Christian healing tradition; contemplative prayer; desert fathers and mothers; desert tradition; devotional prayer; gratefulness; healing; heart rate variability; innate healing; integrated spirituality; intercessory prayer; intrinsic religiousness; meditation; monastic prayer; prayer; prayers of gratitude; psychophysiological coherence; supplication prayer

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The relationship of prayer to health and healing remains an intriguing question for modern medicine. Spiritual practices such as prayer have been shown to improve health and quality of life in virtually all disease states across all demographic populations (Koenig, McCullough, and Larson 2001). Even so, current medical practice places little emphasis on integrative spiritual practices and focuses almost solely on drug therapy despite the fact that no drug has shown such robust effects across so many disease states as prayer. The inability to elucidate a mechanism by which prayer and other spiritual practices affect health and healing is an enigma, prompting further challenges for experimental designs and interpretation of existing research (O'Hara 2002).

Intrinsic religiousness, a term used to describe the degree of faith integration and relationship of spirituality to everyday life, has been shown to be a significant indicator of health benefits (Donahue 1985). It would seem that the more integrated the faith, faith practices, and community support, the more effective spiritual practices are for improving or stabilizing health (Koenig, McCullough, and Larson 2001). However, research on prayer in particular often has been muddied with the assumption that all prayer types are interchangeable with regard to healing effectiveness; the strength of the relational aspect to the Divine by the person praying or receiving the prayer has been largely overlooked. Yet, types of prayer and their connection to an integrated, relational faith life with the Divine may be critical elements in the effect of prayer on health and healing. Research suggests that positive correlations between prayer and health outcomes are more clearly associated with meditative forms of prayer than with petition or repetition prayers, correlating positive outcomes to positive deepening relational components of prayer experience (Poloma and Pendleton 1991). Thus, how a person approaches prayer relationally seems to be directly related to overall well-being and effectiveness of prayer.

Indeed, these conclusions are not new concepts but rather were evident as core principles in the early Christian healing tradition. In the early church, healing was considered paramount in characterizing the community (Kelsey 1995). Prayer for the church was the foundational practice for healing; it was the primary treatment modality accompanied by adjunct therapy with herbs, physiological maneuvers, and surgery. The early Christian prayer life, as recorded by the desert tradition (desert fathers/mothers, including Syriac fathers/mothers) and later embodied as the monastic tradition, distinguished between the types of prayer and their role in healing, as outlined by John Cassian in his writings (Cassian 1997; 2000; Funk 1999; Stewart 1998). Cassian's synthesis of the five types is still used today, namely, prayers of supplication, devotion, intercession, gratitude, and contemplation (pure prayer or prayer of silence depending on Eastern or Western Christian tradition). Prayers of devotion, supplication, and intercession would increase relational awareness, serving to relax and calm the one pray-

ing and shift attention away from stressful, recurring, or destructive thought patterns and feelings leading to illness. Higher or deeper forms of relational prayer such as prayers of gratitude and contemplative prayer were thought to hold the greatest healing power because of their more integrated and intimate relational component to the Divine, reflecting a more personal and humble awareness of the presence and love of God. At the root of all prayer, especially contemplative prayer and prayers of gratefulness, was a deep trust in the work of the Holy Spirit to heal both the inner and outer dimensions of the human person. The Divine image was believed to reside in the heart of each person, and health was directly related to an inner awareness and security of this connectedness to self, others, and God (Brock 1987; Cassian 1997; Clement 1993; El-Meskeen 2003).

With the growth of evidence-based medicine, the connection of prayer and spiritual practices to healing came under greater scrutiny in the effort to find a definitive mechanism of action (Sloan and Ramakrishnan 2006; Halperin 2001). Although it is unlikely that such a mechanism will ever be found, it is possible to observe how certain practices, medications, and physiologic maneuvers affect the body's internal homeostasis and inherent adaptability. Heart rate variability is one way of doing so. Heart rate variability has been shown to be a valuable and validated method of measuring autonomic nervous system balance and inherent adaptability in disease and in therapeutic interventions (Task Force 1996; McCraty et al. 2006; 2001). Between heartbeats there exists a moment of time in which the heart, autonomic nervous system, and brain must flexibly communicate to facilitate cardiovascular and overall homeostasis in response to internal and external stimuli. This brief moment of communication is known as heart rate variability and reflects the dynamic nature of the body's ability to adjust to homeostatic needs in order to maintain optimal physiologic balance. Scientifically, heart rate variability can be traced as either distinct frequency patterns or time domain intervals observed in the natural oscillations between consecutive heartbeats and consecutive instantaneous heart rates. Low heart rate variability is associated with reduced autonomic nervous system adaptability and results in poor long-term prognosis in congestive heart failure (Guzzetti et al. 2005), myocardial infarction (Malik et al. 1989; Tsuji et al. 1994; Bigger et al. 1992), cardiac dysrhythmias (Reed, Robertson, and Addison 2005; Lanza et al. 2006), and overall cardiovascular disease (Palatini et al. 2006; McLaren et al. 2005; Katz-Leurer and Shochina 2005). Low or altered heart rate variability also has been associated with significantly poorer prognosis in many chronic disease states, including diabetes (Vinik and Ziegler 2007; Carnethon et al. 2006; Astrup et al. 2006), cancer (Betterman et al. 2001; Nevruz et al. 2007), depression (Gehi et al. 2005; Carney, Freedland, and Veith 2005a, b), anxiety and stress (Gorman and Sloan 2000; Lucini et al. 2005; Brosschot, Van Dijk, and Thayer 2007), panic disorder (Yeragani et al. 1998), inflammatory

gastrointestinal disorders (Adeyemi et al. 1999; Furlan et al. 2006), and epilepsy (Ronkainen et al. 2005). In these and many other disease states currently being studied, it seems autonomic imbalance and loss of adaptability play a highly significant role in determining both severity and outcome of the disease as well as response to therapy and quality of life.

Research shows that improving heart rate variability results in improved autonomic system balance and restoration of optimal adaptability of homeostatic processes. One way heart rate variability can be improved is by promoting coherent frequency patterns toward 0.1 hertz (Hz), which results in psychophysiological coherence, or an innate rebalancing of the autonomic nervous system (McCraty et al. 2006; 2001). Psychophysiological coherence represents total body entrainment or coherence. In this state all physiologic systems simultaneously merge to operate concurrently at an optimal, single common frequency (0.1 Hz) from which the body is able to maximize internal communication and neurohormonal feedback loops. This phenomenon can be measured directly through the autonomic nervous system response using heart rate variability technology. Physiologically, the body responds to coherence at 0.1 Hz by entering a profound healing or rebalancing state of optimal flexibility that lowers cortisol (stress hormone) levels while simultaneously improving immune response, cardiac autonomic function, cerebral blood flow, and neurohormonal feedback. The result is the restoration of natural adaptive capacity of homeostatic mechanisms and improved clinical outcomes and quality of life.

Psychophysiological coherence ratios based on frequency domain measures of heart rate variability are a simple method of tracking changes in heart rate variability, making advanced technology available at the bedside, home, or office for clinical use. Heart rate variability constitutes one of the very few indices possible for simultaneously observing both disease state imbalance and healing rebalance. Heart rate variability offers a unique insight into the human body's mysterious ability to adaptively restore balance and innately heal. As such, it can be useful in measuring the healing effects of any given therapy, including unconventional therapeutic methods such as prayer. Clues for how prayer and other spiritual practices affect health may be found in how these practices alter neurohormonal feedback, autonomic balance and rebalance, and internal homeostatic flexibility as measured by heart rate variability. Because the body's response to rebalancing seems system-wide, measurements reflecting system-wide balance like heart rate variability may be very helpful pieces in a complex puzzle.

Additionally, heart rate variability appears to be a measure sensitive enough to differentiate intensity of healing effect on the body for different types of prayer. The goal of the preliminary, uncontrolled observations described in the next section was to initiate exploration of a potential correlation of personal prayer type to innate healing via autonomic restoration as measured by heart rate variability using psychophysiological coherence ratios.

METHODS

Five healthy volunteers (female, mean age 42), including the author, participated in prayer periods of five to fifteen minutes for each of the following types of prayer: supplication, devotion, intercession, gratefulness, and contemplative prayer (centering prayer as the form). The following definitions were used for each type of prayer: supplication, one-sided, directed petitions; devotion, rote prayers such as the rosary or Jesus prayer; intercession, open mutual and directed conversation with God; gratefulness, focus on gratitude and thanksgiving; and centering prayer, a form of contemplative or pure prayer. All volunteers were Christian and were familiar with the prayer types, having incorporated one or more on a regular basis in daily life for five or more years. All five volunteers participated in each prayer type with the exception of two who did not complete a devotional prayer time. Because this study was approached not as a controlled experiment but rather as an exploration of something that interested the author, observation methods were not strict with regard to prayer length, body position, place, verbal or nonverbal prayer, or time of day. The measurements obtained were intended to note the effects of prayer on the individuals praying in their natural environment. No effort was made to measure effects on the persons for whom intercessory prayer was offered.

Volunteers placed themselves in relaxed, familiar surroundings. Efforts were made to assure silence and a minimum of distractions during the recording period. Volunteers were not instructed in the content or quality of the prayers and were asked to simply stay within the definition of that prayer type during the measurement time. Heart rate variability and coherence ratios were measured at challenge level 2 using Freeze-Frame™ (now marketed as emWave™) software from HeartMath™. Volunteers sat in a comfortable chair, and measurements were made with a finger sensor. Movement was kept to a minimum to prevent error in data recording and processing. The recordings were obtained in random order based on the preference of each volunteer. Heart rate and spectral analysis were obtained for each session, including power spectral density, frequency patterns, and coherence ratios. The physiological and technical factors involved with frequency ranges, coherence ratios, and power spectral analysis are complex and beyond the scope of this paper but are described in detail elsewhere (McCraty et al. 2006; Task Force 1996). Breathing patterns and rate were not controlled or measured during observation. Because this was not structured as a controlled research experiment, no statistical analysis was intended with the observed results.

RESULTS

All types of prayer elicited varying degrees of psychophysiological coherence and influenced frequency patterns toward moderate to high system-wide

entrainment (Table 1). Prayers of supplication, devotion, and intercession were associated with greater levels of moderate coherence ratios, suggesting a stress neutralizing or moderate shift in adaptability and an initial rebalancing of the body. Prayers of devotion resulted in the highest level of moderate coherence (74 percent) with a corresponding 16 percent of the prayer time interval associated with high coherence. Prayers of supplication were similar with a 65 percent moderate coherence ratio and a 15 percent high coherence ratio. Prayers of devotion and supplication resulted in an average frequency of 0.19 and 0.2 Hz respectively. Intercessory prayer resulted in moderate coherence during 58 percent of the time interval and high coherence in 25 percent, with an accompanying shift in predominant frequency to 0.16 Hz.

Prayers of gratefulness and centering prayer resulted in higher coherence ratios, representing a definitively higher level of adaptability seen with system-wide synchronization between the sympathetic and parasympathetic branches of the nervous system. Prayers of gratefulness resulted in 64 percent of the prayer interval being spent in system-wide entrainment and high innate healing modes, with 32 percent of the remaining time in moderate coherence and rebalance. The peak amplitude centered on 0.14 Hz,

TABLE 1

Prayer Type and Psychophysiological Coherence Ratio Measurements*

Prayer type N=5	Average time in prayer (minutes)	Average high coherence as % of prayer time interval	Average moderate coherence as % of prayer time interval	Average peak frequency	Average heart rate
Supplication (n=5)	5	15% (10–24)	65% (55–82)	0.19 Hz (0.09–0.24)	77
Devotion (n=3)	6	16% (4–28)	74% (58–90)	0.20 Hz (0.21–0.22)	76
Intercessory (n=5)	5	25% (4–43)	58% (50–69)	0.16 Hz (0.08–0.24)	79
Gratefulness (n=5)	5	64% (57–80)	32% (18–41)	0.14 Hz (0.11–0.17)	80
Contemplative (n=5)	15	86% (72–97)	13% (3–27)	0.12 Hz (0.05–0.14)	78

*N=number of volunteers participating; value presented is average % of time interval spent in coherence ratio with range in parentheses. Portions of time interval spent in low coherence with no rebalance so that moderate and high coherence percentages do not add up to 100.

representing a shift toward greater synchronization and flexibility in restoring homeostatic processes. Centering prayer produced an even greater shift with 86 percent of the prayer interval corresponding to high coherence and innate healing and another 13 percent in moderate coherence. Peak frequency activity with centering prayer was closest to 0.1 Hz at 0.12 Hz with virtually no activity in other frequency ranges, suggesting the highest optimal internal restoration of autonomic balance and adaptability.

DISCUSSION

The intriguing results of these uncontrolled observations lead me to speculate that prayer may be effective in restoring autonomic balance and adaptability. The purpose of this discussion is to describe in more detail the speculative possibilities that correlate innate healing with autonomic function, prayer types, and early Christian healing tradition. Autonomic rebalance as a potential mechanism, certainly one of many, could explain in part the unique ability of prayer to promote individual healing, improve personal health across a spectrum of disease states, and result in a variety of outcomes pending degree of relationship to the Divine. It also may explain, in part, some of the discrepancies seen in research data exploring the role of prayer in health and healing.

My observations suggest that prayer types indicative of a more integrated, deeper relational spirituality have the potential to draw the body toward stronger levels of innate healing through more effective restoration of autonomic nervous system balance and adaptability. In these uncontrolled observations, the greatest physiological benefit was associated with prayers of gratefulness and contemplative prayer. My observations are consistent with research showing a trend toward greater benefit with more meditative and relational forms of prayer (Poloma and Pendleton 1991) and also with overall research on religion and health supporting perceived level of integration as a determining factor in benefit of religion to health (Koenig, McCullough, and Larson 2001). Additionally, the observations parallel ancient wisdom suggesting a strong correlation with inner and outer healing as experienced within a loving and direct relationship to the Divine (Brock 1987; Clement 1993; Kulzer and Luckman 1999; Stewart 1998; Gruen 1999). The degree to which heart rate variability is improved seems to be directly related to the degree of autonomic restoration and subsequent potential benefits of prayer for personal or communal healing. This observation appears consistent with heart rate variability correlatives to other treatments, drug or otherwise.

To better understand these results, let us look more closely at the relationship of heart rate variability to autonomic balance, disease, and innate healing. The heart, brain, blood vessels, and other organs are controlled in part by the autonomic nervous system, which is vital for well-being and survival (Lefkowitz, Hoffman, and Taylor 1990). The autonomic nervous

system regulates respiration, circulation, digestion, body temperature, metabolism, and glandular secretions and is divided into two main branches, the parasympathetic and sympathetic systems. These systems have contrasting ways of regulating the body's internal functions and can be viewed as physiologic antagonists necessary for homeostasis. Ideally, the autonomic nervous system is designed to work as a cohesive unit, each system highly flexible and equally balancing the other as if two partners flowing in a dynamic, delicate, and rhythmic dance. When the body comes under stress of any degree, real or perceived, the sympathetic system rapidly dominates in an effort to prepare and maintain the body's ability to adjust to what it considers emotionally, psychologically, spiritually, or physically threatening. Long-term domination by the sympathetic system is detrimental to the body's normal homeostasis and impairs natural flexibility. Impaired ability to rebalance is further aggravated by an overly sensitive response to stimulation, resulting in chronic autonomic imbalance and loss of adaptive capacity leading to illness and eventual death if sustained.

The nervous system is intricately linked to the heart's energy field and internal rhythmic pulsations for its control (Armour 2003). As the most powerful generator of all physiologic energy (electrical, chemical, electromagnetic, or vibrational) in the human body, the heart plays a primary role in achieving and maintaining homeostasis, often guiding the body toward balance or imbalance. Information guiding autonomic adaptive capacity appears to be encoded within the electrical, electromagnetic, and vibratory activity of the heart (Armour 2003; Oschman 2000). Low frequency oscillations as measured by heart rate variability affect electrical, neural, hormonal, and vibratory patterns in the body. Very low frequency heart rate variability wave forms (0.0033 to 0.04 Hz) represent the sympathetic branch of the autonomic nervous system, while high frequency wave forms (0.15-0.4 Hz) represent the parasympathetic branch (Task Force 1996; McCraty et al. 2006). The low frequency range (0.04-0.15 Hz) represents the dynamic interplay between the parasympathetic and sympathetic nervous systems. Within this range sits an optimal frequency, 0.1 Hz, that corresponds with total system-wide coherence in which all major organ and neurohormonal systems resonate at the same single frequency (McCraty et al. 2006; Tiller 1996) concurrently to initiate internal rebalance and optimal adaptive responses and restore homeostasis. It is here that the two branches of the nervous system function in perfect unison, coordinating neurohormonal feedback loops and optimizing communication between all physiologic systems. This phenomenon of system-wide coherence and improved heart rate variability is termed psychophysiological coherence to reflect the wholeness from which natural restorative and innate healing processes are activated. Psychophysiological coherence is a form of innate healing, the body's natural ability to restore optimal functionality, adaptive capacity, and balance.

Physiologically, psychophysiological coherence directly affects innate healing by boosting immune function, reducing stress hormones, improving cerebral blood flow, restoring autonomic tone, resetting neurohormonal patterns, and improving intuition and cognitive reaction times (McCraty et al. 2001; 2006). The end result is a highly efficient state of self-healing encompassing highly complex interdependent chemical and energy responses. Psychophysiological coherence may represent something already inherent in the body seemingly called forth to elicit healing. There currently is no drug that can elicit this immediate degree of innate healing; it is unique to the body itself when heart rate variability is improved. Moderate to high psychophysiological coherence ratios are associated with moderate to high system-wide entrainment based on the strength of frequency patterns aligning with 0.1 Hz. The greater the coherence ratio, the closer the peak and cumulative frequency activity is to 0.1 Hz and the more profound the body's resetting of homeostatic mechanisms, rebalancing of feedback loops, increased synchronization between the two branches of the autonomic nervous system, and restoration of adaptability through neurohormonal balance. Interestingly, once the body is able to enter into moderate or high degrees of psychophysiological coherence, the body will more easily move into these restorative states for longer periods of time even in the face of extreme stress.

Given the impact improved heart rate variability and psychophysiological coherence have on health, what is the relationship to the Christian healing tradition of prayer and the various prayer forms? The idea that the heart is a central driving force for health and healing is not new. In fact, it is very ancient and is found in virtually all major religious and nonreligious healing traditions. The Christian healing tradition is no exception with its teaching on purity of heart, an explicit emphasis on love as the core element of relationship between humanity and the Divine (Kulzer and Luckman 1999; Stewart 1998; Ware 1995). For the desert tradition and early church, the spiritual life was considered a conscious, grace-filled journey to restore the image and likeness of God in the heart of the believer. Purity of heart reflected the journey's goal and visibly manifested the mystery of God in our reality. Indeed, the word *mystery* (Greek *mysterion*) signified not only hiddenness but also disclosure: God was hidden but also revealed as person and as love in those who sought purity of heart. Inner and outer healing and wholeness was associated with growing through love in the understanding, knowledge, and revelation of the hidden God, the presence of the Divine within and through each person.

Is it possible that the desert tradition and later monastic tradition recognized something inherently physiologically whole in spiritual practices such as prayer that grounded one in love? Is the power of prayer both hidden and revealed, ineffably hidden yet physiologically revealed in our body's response? If disease and corresponding severity are related in some way to

autonomic dysfunction, restoration of autonomic balance through prayer would represent a significant therapeutic option in conjunction with current medical treatment for those who choose to enter into relationship with the Divine. It would appear that the heart's ability to both reflect and restore autonomic function and adaptive capacity opens a potential window into both the sacred spiritual tradition and the scientific tradition of health and wholeness.

The Christian healing tradition emphasized prayer from the heart as the core spiritual practice undergirding all personal and communal healing (Gruen 1999; Cassian 2000; 1997; Kulzer and Luckman 1999; Ware 1995; Brock 1987; Clement 1993; El-Meskeen 2003). It was only by being with God, both personally and communally, that one came to be in relationship with God and that subsequent change could occur. As such, prayer was an essential element for a life of transformation and integral to a life journey toward balance, openness, and wholeness. The early church and desert monastic tradition believed in the power of prayer to shift heart focus toward healing, balance, and wholeness, correlating physical illness to imbalances of emotional, spiritual, and psychological energies. Imbalances of excess or deprivation were called vices. The healing tradition identified eight basic human characteristics prone to imbalance as possible etiologies or risk factors for major illnesses: gluttony, lust, greed, anger, sadness, acedia (anxiety), vainglory, and pride (Cassian 2000; Funk 1999) (see Table 2). Chronically suffering from too much or too little of a normal thought or emotional pattern over time was felt to result in rigid, habitual behavioral patterns and subsequent physical illness, which was best treated by redirecting positive efforts toward emotional and spiritual balance. Emphasis was placed on identifying thoughts, feelings, and patterns, the idea being to practice virtue by increasing awareness of perceptions (mental, spiritual, and emotional) leading one to vices or imbalance. Underlying this emphasis was ongoing and ceaseless prayer, considered essential for any healing or rebalancing process to occur. The remedies suggested by the early healing tradition were regular patterns of supplication, devotional, and intercessory prayers to promote greater awareness of the imbalance in thought or emotion and to break open rigid behavioral patterns. Awareness was always followed by deeper relational prayer, which was then steeped in heartfelt focus of love, peace, or gratitude in order to redirect positive healing heart focus for restoration of balance. Prayers of gratitude and contemplative prayers were felt to hold the greatest healing power and were considered necessary for accepting the most difficult constellations of emotional, psychological, spiritual, and physical conditions producing suffering. At the core of these two prayer types was heartfelt love, signifying a strong relationship to God in which the Divine was being revealed and the person transformed as a result of that revelation.

Prayer provided a framework around which the interdependence of inner and outer transformation and healing could occur (Cassian 1997; Gruen 1999; Brock 1987; El-Meskeen 2003; Clement 1993; Stewart 1998). True healing meant true freedom from destructive emotional, spiritual, psychological, and behavioral patterns that might be reflected in outer physical healing but was always inescapably present in a blessed inner conversion and rebalance of emotional, psychological, and spiritual dimensions. Because this freedom was relational in nature, prayer was viewed as the most important element for inviting healing and wholeness. Thus, prayers in a regular rhythm throughout the day promoted intermittent periods for healing and insight offered in the present moment, inviting God as mystery and divine healer. The origin of the liturgy of the hours in the monastic tradition is rooted in this perception of ongoing healing or transformation through ongoing, growing awareness and experience of the loving presence of God. This perception extended to early hospitals in monasteries, where patients participated in the liturgy of the hours and were consistently included in prayers.

TABLE 2
Imbalances, Physical Manifestations, and Remedies*

Vice (imbalance)	Physical manifestations as disease states potentially affected by imbalances	Remedy suggested by Cassian and Christian mystics
Gluttony	obesity, type 2 diabetes mellitus, food addictions, stress	fasting, prayerful meditation on thoughts to reawaken awareness
Lust	addictions, anxiety, depression, stress	silence, solitude, prayers and mindfulness focused on God's love
Greed	anxiety, depression, stress, heart disease, cancer	prayers focused on gratitude and love
Anger	stress, heart disease, cancer, depression, suicide	prayers focused on peace and love
Sadness	depression, anxiety, suicide, heart disease, cancer, stress	prayers turning outward in hope and inward in gratitude
Acedia (anxiety)	stress, anxiety disorders, personality disorders, depression, heart disease, cancer	prayers focused on love and gratitude
Vainglory	subtle influence on heart disease, depression, stress, cancer, anxiety	prayers focused on gratitude, love, and compassion
Pride	subtle influence on all disease states	prayers focused on gratitude and love

*From Cassian 2000; 1997; Funk 1999.

What is the correlation of each type of prayer to healing, heart rate variability, modern research findings, and psychophysiological coherence as observed in this essay?

Supplication prayers petitioned God for personal needs and forgiveness and were considered indispensable to the healing process. These prayers humbly asked for God's help to meet needs and overcome actions, beliefs, or attitudes distancing one from God, others, and self. This type of prayer was thought to be essential for the beginning of the spiritual journey and a basic practice throughout life to foster awareness of interdependence with God. The results of our uncontrolled experiment indicate that supplication prayers may inaugurate a moderately effective healing process, serving to potentially neutralize stress, improve heart rate variability, and initiate rebalance. There may be something inherently healing in simply vocalizing one's needs to God, resulting in physiological shifts to relax the body, draw it toward a moderate degree of autonomic rebalance, and restore, even if only for a moment, inherent adaptive capacity. These observations are consistent with another published report on verbalizing under stress (Bernardi et al. 2000) that showed similar complex findings in heart rate variability parameters. Those who verbalize under stress alter heart rate variability to initiate autonomic rebalance, often by respiratory changes invoked by slower, deliberate speech. The early Christian healing tradition considered verbally naming to be a powerful means of both blessing and letting go. It was an essential part of most healing rituals such as confession and other rituals of forgiveness in the faith community (Brock 1987; Cassian 1997; Clement 1993). Perhaps this simple form of prayer names desires, fears, insecurities, needs, shames, and failings and serves to initiate a healing process even at the basic cellular level, as taught in the desert tradition.

Devotional prayers usually have represented a desire to seek relationship with God through personal and communal prayers such as the Lord's Prayer, the rosary, the Jesus prayer, and the Magnificat. Much like prayers of supplication, devotional prayers seemed to elicit moderate degrees of improved heart rate variability and healing in this observation through the simple voicing of trust in God and acknowledging God's active love in our lives. Interestingly, the only other reported measurement of heart rate variability with devotional prayers (Bernardi et al. 2001) was a study using the rosary prayer. The results of this study produced findings similar to those in this observation: a marked improvement in heart rate variability parameters toward autonomic rebalance with the rosary prayer. The rosary prayer has a rhythm formula producing a breathing pattern of approximately six breaths per minute, which induces favorable psychophysiological effects consistent with respiratory sinus arrhythmia. It seems that rhythm has a mysterious power to restore balance and initiate healing, especially when breathing is patterned as a result. This was one basis for using mantras in healing traditions and for the use of the Jesus prayer and rosary in the

Christian tradition. Perhaps the repetition involved in devotional prayers potentially improves outcomes by gently blocking physiological mechanisms promoting disease progression through altering breathing rhythm and redirecting emotional focus.

Intercessory prayers were simply petitions for others and for personal transformation throughout the Christian healing tradition. These prayers conveyed a growing trust in God through an increasing outward compassion for others. In intercessory prayer, petitions were coupled with a listening heart, thus differentiating it from supplication prayer. As a common form of prayer for faith communities and personal devotional times, intercessory prayer suggested a shift in emphasis toward living out one's core belief rather than simply professing a belief. A multitude of studies on intercessory prayer over the past thirty years show both benefit and lack of benefit for health and healing (Byrd 1988; Benson et al. 2006; Masters, Spielman, and Goodson 2006; Roberts, Ahmed, and Hall 2007). Recent meta-analysis and reviews have argued the benefit or lack thereof from intercessory prayer, citing a polarization of views on prayer as a whole and including data that are confusing at best. Most studies show a correlation of more positive perceptions of disease with those who pray about their illness and are active in a faith community (Koenig, McCullough, and Larson 2001). In many instances, the effect of prayer for someone else in the form of intercessory or supplication prayers has been the primary focus of the research. However, studies continue to struggle with study design issues, often approaching prayer as if it were a static medication rather than a dynamic interpersonal experience. No study has actually looked at the psychophysiological effects of intercessory prayer to determine if something more subtle may be happening in the midst of prayer on either the person praying or the one on whose behalf the prayer is offered. In our uncontrolled observation, intercessory prayer represented an interesting and definitive frequency pattern shift to a peak at 0.16 Hz. It has been demonstrated that humans transfer information through energy, with electrical activity often a measure of shared electromagnetic and noetic fields (Oschman 2000; McCraty et al. 2001). It seems logical that the degree of improvement in heart rate variability and corresponding psychophysiological coherence attained could influence outcomes related to intercessory prayer, suggesting that the stronger the coherence the greater the potential benefit.

If the level of coherence or improvement is critical for energy and information transfer from one person to another, intercessory prayer might affect change through energy and/or information transfer theories. When comparing integrative noetic therapies, off-site intercessory prayer for another individual may be more beneficial when directly compared to imagery, relaxation, or healing touch (Krucoff et al. 2001; 2005). Again, the level of coherence by the practitioner likely influences all of these therapies,

with the greatest effects theoretically seen in practitioners who achieve the greatest level of psychophysiological coherence and in the most receptive patients. Supporting this is research on Eastern practices for energy healing (Qigong) that shows a relationship of autonomic balance in practitioners to relative healing outcomes (Lee, Kim, and Lee 2005a, b). Part of the enigma with intercessory prayer research may lie in the inability to consistently produce high levels of coherence for the one praying (or perhaps the one being prayed for) unless infused with other forms of prayer rooted more deeply in relational gratitude or love. Intercessory prayer could represent a so-called liminal space stretching across a complete spectrum of physiological benefit for the person praying, from the most rudimentary self-absorbed encounter with little physiological effect to a completely engaging selfless one with great benefit. It would seem that awareness of God, relationship with God, sense of presence of God, mutuality, love for God, and other relational aspects could potentially affect the level of heart rate variability improvement, psychophysiological coherence, and subsequent overall benefit. This certainly is true in the human dimension of sharing information and energy. It would be difficult to control or measure such dynamics in a study not designed to consider them. Interpersonal relational dynamics would be a vital piece of information, shedding light on the confusing data surrounding prayer and health. It could elucidate why treating intercessory prayer like a study medication seems ineffective in most instances. Another consideration is the patient who is being prayed for. The level of receptivity and the possibility of others not in the study praying for him or her cannot be ignored. A collective consciousness of healing for any one person, whether formally stated or not, could theoretically influence the outcome. Thus, it seems likely that the research data for intercessory prayer will continue to be markedly varied if this form of prayer represents something as fluid and importantly inherent in the person praying as in the one being prayed for. Research has not yet thoroughly addressed this fundamental issue.

Prayers of thanksgiving were a cornerstone for healing in the early Christian church and a core characteristic of an integrated faith grounded in humility, openness, and awareness. Such prayer revealed a growing trust in God and openness to transformation necessary for healing. Prayers of thanksgiving both preceded and followed healing, giving evidence of trust in God's ongoing presence in the heart of all believers. Prayers of gratitude were common throughout the early church and remain so today, the most evident being the Eucharist. Prayers of thanksgiving were one of the most prescribed forms of prayer for treating illness or imbalances by the desert tradition (Brock 1987; Cassian 2000; Clement 1993); in fact, Cassian understood gratitude as a basic cornerstone of contemplation. The power of gratefulness to deepen an awareness of life as it simply exists and to thereby receive God's mercy, love, and compassion were considered critical for any healing process.

The power of gratefulness to transform lives may be related in some way to the very high degree of psychophysiological coherence and improved heart rate variability achieved with regular practice, as noticed in our volunteers. Our observations showed a definitive overall shift to 0.14 Hz with a resulting increase in high psychophysiological coherence ratios during 64 percent of the prayer interval. This marked quite a shift toward higher levels of psychophysiological coherence and greater improvements in heart rate variability when compared to the three previous prayer types.

Unlike the conflicting research with intercessory prayer, current research into gratefulness and appreciation show similar consistent positive benefits to health as measured in many ways. High levels of psychophysiological coherence have been documented with thoughts and feelings focused on gratefulness, showing a similar shift in heart rate variability peak frequency patterns toward the 0.1 Hz frequency with restoration of autonomic tone (McCraty et al. 1995). Programs incorporating gratefulness or appreciation have been effective in the treatment of stress, heart disease, and anxiety disorders as documented by subjective evaluations and objective heart rate variability parameter changes (McCraty et al. 2001; 2003; Luskin et al. 2002). Other studies have shown that grateful people report significantly higher levels of positive emotions, life satisfaction, vitality, and optimism and lower levels of depression, anxiety, addictions, materialism, obsessive ruminations, and stress (McCullough, Tsang, and Emmons 2002; 2004; Emmons and McCullough 2003). The tendency to recognize and respond with gratefulness to benevolence seems to be a powerful healing and restorative force for the grateful person. In addition, there is a strong positive correlation between gratefulness and intrinsic religiousness. The most grateful score highest on measures of integrated spirituality and religiosity (Kendler et al. 2003). This correlation extends beyond traditional religiousness and works equally well with nonsectarian measures of spirituality that assess spiritual experiences and sentiments independent of theological orientation. Gratefulness elicits a degree of emotional, psychological, spiritual, and physical unity both inwardly and outwardly, creating a unique heart rate variability pattern seemingly distinct from general positive emotions such as happiness or contentment (Bono and McCullough 2006). As was taught by the early Christian healing tradition, intentionally fostering a grateful mood highly benefits overall health and well-being.

The fifth type of prayer, contemplative or “pure” prayer, was a natural outgrowth of fidelity to the other types. The desert tradition considered this form of prayer paramount to any healing process because it fostered a sense of ongoing loving presence in direct opposition to a more secular illusion suggesting absence of God (Brock 1987; El-Meskeen 2003; Stewart 1998; Clement 1993; Ware 1995; Cassian 1997). Cassian considered contemplative prayer an encounter with the reality of the Divine that allowed one to move beyond self-awareness into an experience of transcendent love.

Cassian noted that these encounters practiced in a regular daily pattern often resulted in total freedom over time from vices and the imprisonment of rigid, imbalanced thoughts, emotions, and behaviors. Contemplative prayer practiced regularly was considered vital for ongoing transformation of the heart, healing, and overall health.

Contemplative prayer, one form of which is centering prayer, is a quiet, imageless prayer form similar in many ways to meditation (Keating 1998; 2001). However, it is uniquely different from meditation because of its singlehearted focus on awareness of the presence of a loving God and on forgetting oneself into God through grace and love. Perhaps one of the best descriptions of contemplative prayer type outside of the desert fathers is found in the spiritual classic *The Cloud of Unknowing* (Johnston 1996), which Thomas Keating uses as a foundation for modern centering prayer practice. The early church believed in Divine indwelling as an ever-present dynamic force sustaining physical, psychological, emotional, and spiritual life. The reign of God was the continual work of God within humanity and the human heart bringing about transformation, balance, and healing. The concept of the Trinity as God in three persons was a way of expressing the mystery of God's presence in human life and the greater creation, a concept very different from being present as one human person to another. By slowly moving into the freedom experienced through awareness and communion in the presence of God, powerful healing could be manifested as significant shifts in emotional intelligence, psychological healing, and spiritual growth as detailed by the desert tradition and still experienced today.

The results of our uncontrolled observation suggest that contemplative prayer may indeed represent some form of physiological culmination of innate healing, resulting in a rapid and powerful degree of psychophysiological coherence (86 percent) with a peak frequency of 0.12 Hz. It seems that the desert fathers/mothers were accurate when they spoke of this prayer as a more holistic and powerful force for healing than meditation or mindfulness alone. There are no other studies with heart rate variability and contemplative prayer. However, there are heart rate variability studies observing other contemplative activities such as yoga and mindfulness techniques (Arias et al. 2006; Takahashi et al. 2005; Peng et al. 1999; Vempati and Telles 2002; Lehrer, Sasaki, and Saito 1999). Results from studies on yoga and Zen-based mindfulness meditations involving breathing techniques show similar heart rate variability improvement trends as observed here with regard to moderate autonomic rebalancing and adaptive capacity. Although meditation as a whole lacks clear and reproducible evidence supporting efficacy from large studies, smaller studies using very specific forms of yoga or Zen mindfulness meditation where heart rate variability parameters are measured show a direct correlation to effectiveness. Techniques that involve more integrated forms of mindfulness seem to be more effective in restoring autonomic balance. Not surprisingly, research com-

paring mindfulness techniques with integrated spiritual approaches show integrated spirituality to be more effective in consistently positively altering heart rate variability parameters toward improved homeostatic adaptability (Moritz et al. 2006). Interestingly, the desert tradition considered mindfulness a step to lower anxiety as one moved toward contemplation, thus differentiating the two with respect to overall outcomes in healing and practice (Brock 1987; Stewart 1998; Cassian 2000). Mindfulness was awareness of self and the present moment, whereas contemplation was a very specific intentionality of attentive awareness to the ongoing loving presence of God. Research is beginning to differentiate individual trait anxiety levels with responses to Zen meditation; lower trait anxiety correlates well with a tendency toward meditation-induced internalized attention, while higher trait anxiety is associated with a tendency toward meditation-induced relaxation (Murata et al. 2004). In other words, the better an individual can singly focus awareness internally, the more profound the physiologic shifts toward healing may be. Higher levels of anxiety or external awareness limit the practice to one more of relaxation than deep restorative healing. The implications for comparing different meditation techniques and prayer forms for healing are intriguing and may offer insight into differential physiologic responses with regard to autonomic function and healing.

The results observed with contemplative prayer seem consistent with the trend seen in the limited literature on heart rate variability changes in meditative states. It appears that deep forms of quieting the body and mind are capable of inducing autonomic rebalancing, which is beneficial in many disease states with known autonomic imbalance. The high degree of heart rate variability improvement and psychophysiological coherence noted with contemplative prayer suggests a subtle physiological difference with this prayer type, potentially affording greater healing benefits beyond that of simple mindfulness or meditation. If contemplative prayer at its greatest represents a form of relational union with God, perhaps the body physiologically responds by revealing wholeness itself as reflected in a uniform coherence, expressing oneness both inwardly and outwardly. The human body seems to be capable of several degrees of innate healing and autonomic rebalancing such that differing prayer practices of varying intensity and relational focus produce corresponding variable levels of flexibility and healing specific to wholeness and homeostasis.

Given the varied responses in autonomic tone restoration to differing prayer types, promoting prayer as an adjunct to medical therapy may be most effective when the prayer type and relational aspect of the patient to the Divine are considered. The effectiveness of prayer seems ineffably joined with an individual's degree of awareness, openness, and sense of presence of and desire for engagement with the Divine. If we are perceptually rigid,

we tend to become physiologically inflexible. Prayer is a sacred and dynamic relationship that cannot be prescribed like a static medication. The teachings of the desert tradition are remarkably wise when it comes to prayer as a treatment modality, suggesting that prayer may become a powerful therapeutic option when aligned with an individual's own unique desire for relationship with God and a willingness to accept the human condition. The desert fathers/mothers suggested a daily rhythm of simple prayer and mindfulness as the basis of growth toward the more deeply healing and relational forms of prayer seen with gratefulness and contemplation. The human body responds inherently to something within its very composition that acts a barometer and guide toward wholeness and healing; we have only to desire to enter into relationship with it.

CONCLUSION

The observations in our uncontrolled experiment seem to parallel the assumptions of the ancient Christian healing tradition and correspond to the limited information available addressing heart rate variability and psychophysiological responses to prayer. If psychophysiological coherence ratios are a reliable measure of heart rate variability improvement and innate healing processes, prayer type is an important consideration. This may explain some of the varying results seen in prayer research. Because differing prayer forms seem to have differing effects on heart rate variability, prayer types cannot be used interchangeably in studies. As prayer moves more consciously and intimately into relationship with a loving God, the body responds in ways that promote healing, adaptability, and wholeness, all of which potentially affect clinical outcomes. If the design of a study is to simply have participants pray with no regard to the relational aspect of the prayer itself to the person praying or being prayed for, the margin of success may be limited. How a person personally approaches prayer appears to be an essential component in how his or her body subsequently responds in healing, regardless of the prayer type. Intercessory, devotional, and supplication prayers seem to exist in a dynamic liminal space stretching between self-absorption and self-giving, rigidity and flexibility, as well as between perceived absence and presence of the Divine. This may be one reason why the early Christian healing tradition focused on gratefulness and love as a foundation for authentic conversation between humanity and God. It was one pathway to overcoming the illusion of separation from a loving God in the experiences and suffering of human life. Gratefulness led one to awareness outside of self, while contemplative prayer expressed security in the ongoing, transcendent presence of God as healer and author of life. The impact on health seems more than just coincidental and echoes a core need of being human—to be securely interconnected, both giving and receiving love.

The findings presented here are simply observations of five individuals in a homelike environment. More rigorous research is needed to reproduce and validate these observations and confirm these speculations as beyond coincidence. However, more intriguing to this author are the following questions. What if these observations not only parallel ancient wisdom but also offer medical research another view of the complex relationship between healing, spirituality, and health? What if heart rate variability does represent a unique and measurable insight into the body's ability to adapt and holistically heal, thus affirming the ancient Christian healing tradition while simultaneously concurring with current evidence-based medical practices? In the end, the observations leave more questions than answers, more ambiguity than clarity; they offer yet another place to explore the role of innate healing and spirituality. Throughout the Christian healing tradition, to become fully alive has been to become fully aware of the Divine at work within us to heal and authenticate right relationship to self, others, and God. Spiritual practices grounded in a journey toward awareness, freedom, and integration are ancient yet modern, instinctive yet proven pathways to wholeness. The power of merging ancient wisdom with modern science is a lesson we are still learning, for mystery lies at the heart of both, and genuine healing rests in the communion of their diversity.

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