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Guided imagery as a psychoneuroimmunological intervention for HIV-positive individuals

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GUIDED IMAGERY AS A PSYCHONEUROIMMUNOLOGICAL

INTERVENTION FOR HIV-positive INDIVIDUALS

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A Dissertation

Presented to

The Faculty of the School of Education

The College of William & Mary in Virginia

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In Partial Fulfillment

of the Requirements for the Degree of

Doctor of Education

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by

Christopher Dale Keene

May, 1996

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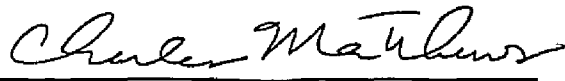
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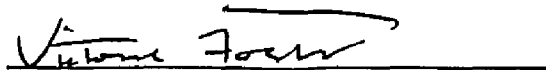
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Chairperson of Doctoral Committee

DEDICATION

To my partner Bret Sawyer who has been my love and support.

To my family who has given me the gift of learning.

and

To Johnathan Bronson who lived his life with AIDS in dignity

and was an inspiration to those who knew him.

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CHAPTER I

INTRODUCTION

Justification for Research

Surgeon General Antonia Coello Novello opened her 1993 report to the American people by saying, "It began, like so many epidemics, with a few isolated cases, a whisper that caught the ear of only a few in medical research. Today, that whisper has become a roar heard around the world" (Novello, 1993). Few people will argue that Acquired Immune Deficiency Syndrome (AIDS) is the major medical crisis of our country today. In 1993, the Surgeon General reported 1,000,000 cases of Human Immunodeficiency Virus (HIV) infection in the United States.

By 1995, the World Health Organization reported that between 13 and 15 million people are HIV-infected worldwide; HIV is infecting about 6,000 people per day, half of whom are under the age of 25. Since the first identified case in 1981, more than 501,310 people have developed AIDS, and of those infected, 325,851 have died (Centers for Disease Control, 1995). Of the total AIDS cases, 10 percent were reported during 1981-1987, 41 percent during 1988-1992, and 49 percent during 1993- October 1995. The prognosis for people living with HIV and AIDS is not good, with only 35% of those first infected still living. It is estimated that in 1993 alone between 47,000 and 66,000 Americans died of AIDS. The disease can no longer be identified exclusively with white gay males. Among women, the

proportion of cases increased from 8 percent between 1981 and 1987 to 18 percent between 1993 and October 1995. During the same intervals, cases rose from 25 percent to 38 percent and from 14 percent to 18 percent among blacks and Hispanics, respectively. In addition, 10 percent of new HIV cases stem from heterosexual contact, an increase of 7 percent since 1987. In the gay population, where many educational efforts have focused, the proportion of cases decreased from 64 percent to 45 percent.

To add further concern, researchers now believe that there are two distinct strains of the virus, HIV-1 and HIV-2. However, a number of medical researchers no longer believe that the virus is solely responsible for AIDS; these scientists now emphasize the importance of "cofactors" that can range from frequency of sexual intercourse to emotional affect, including the HIV-infected individual's ability to handle stress both internal and external (Gorman & Kertzner, 1991).

Psychoneuroimmunology (PNI) is an emerging field in science exploring the psychological/immunological relationship. Investigators in PNI are guided by a theory which predicts that a person's immunity can be enhanced through psychological intervention. PNI research also has revealed the influences that psychosocial factors have on immunity. Because PNI focuses on the psychological relationship of immunity to the onset of immunologically resisted diseases, PNI research on HIV seems logical. Solomon (1987) underscored this point by stating that

"[it] seems clear that AIDS is 'ideal' for study from a psychneuroimmunologic frame of reference, in view of its being a disease resisted by immunity, a disease of immune dysfunction ... and a disease that can involve the central nervous system" (p. 629).

PNI literature does demonstrate a positive relationship between psychologically-based treatment interventions and the human immune system. In light of the devastating impact that HIV has on that line of bodily defense, there is justification to research the relationship a particular counseling intervention may have to an individual's immunocompetence. The purpose of this study is to examine the effect of immune system guided imagery on HIV-infected individuals' production of secretory immunoglobulin A (S-IgA), an essential secretory antibody. This study may contribute significantly to existing knowledge on the relationship between emotional states and immunocompetence and more importantly, may validate a therapeutic technique that can improve the quality of life for HIV-infected people.

Problem Statement

What is the efficacy of immune system guided imagery in enhancing the (unstimulated) production of S-IgA in an HIV-infected individual?

Theoretical Rationale

John B. Jemmott III has stated that "A fundamental task for health psychology is to clarify the complex interactions between psychological variables and physical health" (1985, p. 497). The research field interested in this connection was first called psychoimmunology, a term coined 29 years ago by psychiatrist George Solomon (Solomon, 1987). Solomon supported his theory of an actual link between the mind and the immune system by citing scientific evidence such as his 1969 demonstration of stress-induced suppression of humoral immunity in rats. Over the past three decades, an interdisciplinary field has emerged focusing on the nervous, immune, and endocrine systems and now referred to by most researchers as psychoneuroimmunology (PNI) (Vollhardt, 1991). Although a sizable body of research underscores the psycho-immunity relationship, a definitive explanation into the process has yet to be articulated. One possible explanation stresses that most PNI research designs do not adequately address the full complexity of the human immune system (Jemmott, 1985). Some studies on the physiological process suggest a direct anatomic connection between the central nervous system and the immune system. Nerve fibers, for example, have been found linking the two systems (Gorman & Kertzner, 1991). Another theory, on the healing powers of imagery, centers on activating the right brain hemisphere with images in order to inhibit the

release of immunosuppresant chemicals from the left

hemisphere (Sheikh, 1984).

Though the processes are not fully understood, PNI

research is guided by an accepted general theory. Simply stated,

the brain and immune system are part of an intricate, interactive

system. Foss and Rothenberg (Vollhardt, 1991) affirm that, "PNI

is best conceptualized as a cybernetics or systems approach" (p.

45). These systems have inputs, outputs, boundaries, and, most

importantly, interactions. Despite the newness of the field, PNI

theory is well-supported by a diverse body of research.

Lower-animal studies, noteworthy because they exercise

greater experimental control than is possible with human

subjects, provide some of the most credible and convincing

results supporting PNI theory. The first important discovery

related to the mind/immune system link was achieved in 1974

by Ader and Cohen who found that the immune system of white

rats could be classically conditioned (Vollhardt, 1991).

Investigators paired the sweet taste of saccharin-laced water (a

conditioned stimulus) with an intravenous injection of an

immunosuppressive drug (an unconditioned stimulus) which

causes nausea (an unconditioned response) in the rodents. After

several repeated administrations of the saccharin/drug stimuli,

the rats were then exposed to a novel, second pairing: saccharin

with an antigen. The results were compelling: the rats showed

significant immunosupression despite the absence of the drug,

suggesting a conditioned response. To account for the possible

effect that nausea-related stress may have had on the rats, during the second treatment the rodents were injected with lithium chloride which causes stomach upset without immunosuppression. The investigators concluded that "there was no ensuing immunosuppression with lithium chloride" (Vollhardt, 1991, p. 42) Ader and Cohen's early experiment suggests that the immune system is not a separate entity from the brain, but rather that "there is bidirectional communication between the central nervous system--the seat of thought, memory, and emotion--and the immune system" (Vollhardt, 1991). Since the early work in the 1970s, other researchers have demonstrated communication between the nervous system and immune system. In one study, for example, brain lesions changed immune system response rates in laboratory animals (Vollhardt, 1991). Studies on brain stimulation and lateralization have offered further evidence of the relationship between the central nervous system (CNS) and immune systems.

Other reports have posited that activity levels in the immune system can be influenced by stimulating certain areas in the brain (Plotnikoff, 1987). Researchers discovered that antibody levels in animals can be changed by placing lesions in the subjects' hypothalamus (Vollhardt, 1991), and related studies on the lateralization of emotions suggested that the left hemisphere of the brain may be responsible for positive emotions and immunomodulation (Pelletier, 1988).

The effects of stress on immunity have also been explored in animal research. Overcrowding, electric shock, and exposure to intense sound all reduced immunocompetence and increased susceptibility to cancers and diseases in laboratory animals (Pelletier & Pelletier, 1988). Many empirical studies found that immunity is suppressed when animals feel helpless or hopeless under a stressor (Vollhardt, 1991). One study found that chronic physical stress can enhance immunity in some animals, a phenomenon that may be caused by an immune system temporarily overreacting to a stressful event (Borysenko, 1984).

Starting with well-controlled animal studies, researchers are beginning to compile a body of empirical evidence which strengthens the PNI work with human subjects. To date, most PNI research has been published in psychiatric journals although PNI is an interdisciplinary field and offers a broad view of science (Jemmott, 1985). For example, one interdisciplinary study focused on the relationship between immunity and depression (Weisse, 1992). Investigators have also examined psychological influences on cancer, stress, and AIDS (Thackwray-Emmerson, 1988).

Because HIV primarily destroys the immune system, PNI interventions, theoretically, should benefit the infected individual. In their recent book on PNI, Gorman and Kertzner (1991) devote an entire chapter to the importance of future PNI/HIV research. As early as 1987 Solomon addressed the relevance of research on the relationship that psychological

factors may have on the presence or severity of symptoms in AIDS patients. If the theory is valid, PNI techniques may provide a valuable part of a holistic treatment protocol.

Several general PNI interventions have been suggested. Group and individual therapy models have included health education, problem-solving training, relaxation, and stress management techniques (Antoni, 1991a). Other study protocols have implemented mental imagery, cognitive restructuring, and assertiveness training (Antoni, Schneiderman, Fletcher, Goldstein, Ironson, & LaPerriere 1990). Immune system imagery, in particular, has produced encouraging results, and in one study appears to be potentially effective in treating HIV-positive individuals (Rider, 1990). Specifically, immune system imagery is based on the belief that by evoking mental images of a robust immune system, people can physiologically enhance their own immunity. Such images may involve antibodies attacking a cancer cell, for example. To date, however, the efficacy of guided immune system imagery on HIV-positive subjects has not been documented.

Imagery as a treatment technique has demonstrated effectiveness, but the actual psychological and physiological processes involved are not fully understood (Achterberg, 1984). Consequently, a universal imagery theory has not emerged despite various theoretical models. An early example is Aristotle's observation that imagination can produce physiological arousal (Sheikh, 1984). The efficacy of imagery has

a rich history rooted in many cultures. For example, initiatory rituals unique to Siberian and central Asian shamanism include a series of "waking dreams," while in China, Taoist meditation is used as a method to maintain an "eternal calm in the midst of changing conditions" (Mishlove, 1993, p.36). Imagery is not exclusively an Eastern tradition however.

In exploring the modern Western understanding of spirituality, Jungian psychotherapist Thomas Moore reaches back to a rich European history of myth and symbol. He states, "Whether we know it or not, our ideas about the family are rooted in the ways we imagine the family. That family, which seems so concrete, is always an imaginal entity" (Moore, 1992, p. 32). Moore opines that the imaginal family figures can be further understood through myth. For example, Moore questions, "How can I evoke a father myth in a way that will give my life the governance it needs?" (Moore, 1992, p. 33). To answer this question, he explores the paternal images found in Homer's The Odyssey. Even though Moore comments on the importance of the image to the ancient Greek, the use of imagery in Western-style psychotherapy was not popular until recent years (Sheikh, 1984). The use of therapeutic imagery was accepted even more slowly by American mental health professionals. The primacy of behaviorism in the United States helped to limit widespread use of imagery, but the emergence of the humanistic movement in the middle of the 20th century has reversed the prejudices of many therapists. Sheikh notes, "from

a position of near disgrace, imagery recently has risen to be one of the hottest issues in both clinical and experimental cognitive psychology" (p. 28).

In sum, psychoneuroimmunology provides a theoretical rationale that can be arguably described as elegant in its simplicity. The theory is both ancient and modern, scientific and spiritual. When PNI theory is applied through the technique of imagery, it becomes a lucid archetype for expanding our current understanding into the complexities of the human mind and body.

Definition of Terms

<u>Acquired Immunodeficiency Syndrome (AIDS) Stage IV</u>-- The clinical diagnosis that may be given when an individual has a CD4+ cell count under 200 and/or has had an AIDS-related opportunistic infection (e.g. Pneumocystis carinii pneumonia, Kaposi's sarcoma, Cytomegalovirus, Mycobacterium avium intracullalare, etc).

<u>Antibody</u>-- Antibodies are highly specific molecules that combine with a harmful antigen in order to neutralize the invader or tag it for attack by other chemicals or cells.

<u>Antigen</u>-- Antigens are foreign materials that invade a body; they include bacteria, parasites, fungi, and viruses.

<u>Helper T Cell</u>-- This is an immune system lymphocyte that identifies antigens and stimulates the production of other immune cells to fight an infection. Helper T cells are also called CD4+ cells. A CD4+ cell count is a measure of the damage to a person's immune system; the probability of an opportunistic infection is increased as CD4+ cell counts become lower. A healthy person without HIV infection typically has CD4+ counts between 800 and 1100.

<u>Human Immunodeficiency Virus (HIV or HIV-1)</u>-- A human retrovirus that invades and destroys helper T cells which in turn reduce an infected individual's ability to defend against other harmful antigens. HIV can be transmitted through the blood, semen, or vaginal secretions of an infected person. Other

potentially infectious materials include: cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, and saliva which contains blood (Virginia Dept. of Labor and Industry, 1992)

HIV-positive-- This is the status given to an individual who tests seropositive for the presence of the HIV retrovirus.

Immune System Guided Imagery-- This is a therapeutic technique in which individuals mentally visualize the manipulation and enhancement of their immune system.

Psychoneuroimmunology (PNI)-- This is the field guided by the theory asserting that nervous, endocrine, and immune systems are interconnected and interdependent.

Radial Immunodiffusion (RID)-- This is an assay method providing an accurate measurement of an antibody in a mixture of diverse antibodies. The RID method can be used in obtaining S-IgA measures in human saliva.

Secretory Immunoglobulin A (S-IgA)-- S-IgA is a predominant antibody class in bodily secretions. S-IgA is present in the oral cavity providing a defense against upper respiratory infections.

Specific Research Hypotheses

Hypothesis 1

H1: HIV-positive subjects who are administered guided imagery will have significantly elevated S-IgA concentrations immediately following treatment compared to control HIV-positive subjects.

Hypothesis 2

H$_2$: HIV-positive subjects administered guided imagery will have significantly elevated S-IgA concentrations two weeks following treatment compared to control HIV-positive subjects.

Sample Description and General Data Gathering Procedures

Twenty-four adult HIV-positive men with CD-4 cell counts below 200 were the focus of this study. All individuals were participants in an AIDS treatment program and were recruited through their treatment coordinator. When a person agreed to participate in the study, a consent form (Appendix A), which outlined the overall focus and procedures of the experiment, articulated the subject's rights, and cited any mental or physical risks, was signed by the individual.

Participants were randomly assigned into either the experimental or control group. The experimental group met for 90 minutes to complete a health questionnaire and partake in the immune system guided imagery intervention. A pretest and posttest saliva sample was collected at the meeting. The control group completed the health questionnaire and had saliva samples collected without receiving any treatment. The time delay between the pretest and posttest sample collection was 60 minutes for both groups. Fourteen days following the first data collection, both groups provided a second posttest saliva sample.

Limitations of the Study

Threats to internal and external validity are listed below along with the attempts that were made to minimize their negative effects on the study.

To lessen the impact of maturation effect and experimental mortality, the entire research period was limited to 14 days. This consideration is especially important whenever studying subjects with HIV. Using random assignment to experimental and control groups helps control for maturation effect (Best, 1989) The limited time interval between the pretest and final posttest may have reduced the influence of history on the subjects.

Testing effect was likely limited because the pretest and posttest measures were saliva samples. It is unlikely that any "practice effect" developed considering the dependent variable used in this study. However, even with a saliva measure, unstable instrumentation can be a threat to internal validity.

The sampling procedures used in this study were based on protocols used in several studies using a S-IgA measure (McClelland & McClelland, 1988). In addition, universal precautions for handling body fluids were observed and the samples were collected by a licensed healthcare provider. The RID assay used to measure the pre/posttest samples is a stable

and accurate method for for S-IgA. In addition, the assay was performed under the supervision of a biologist.

Selection bias is another threat to the internal validity of this study. All subjects were volunteers. It is likely that they may not be representative of the greater population of HIV-positive individuals. However, random assignment of the particpants to the experimental or control group is the most effective deterrent to nonequivalence between the two groups.

In an attempt to control for the contaminating effect of experimenter bias, the investigator had no contact with the subjects. Participants were identified only by the last six digits of their Social Security number. All samples were collected by a healthcare professional not involved with the study, and the intervention was administered on audiotape.

Possible threats to external validity were also considered. Inference of prior or concurrent treatment may have influenced the results; the investigator could not control for any medical or psychological interventions that occured prior to or along with the guided imagery treatment in this study. The health questionnaire revealed that only one individual reported having done "trance work," but all participants reported group counseling experience. In addition, the subjects were taking various medications for AIDS.

The artificiality of the experimental setting is another possible threat to external validity. Though the audiotape was administered in a setting familiar to all experimental group

subjects, the environment would be considered typically "clinical." The room was well-lighted and had padded, institutional-style chairs; however, the setting is not optimal for imagery exercises. Usually a softly-lighted, comfortable, "warm" environment is desired for imagery, trance, or hypnotic interventions.

One final threat to external validity centers around the verification of treatment. By using a colleague to collect samples and administer the intervention, the investigator looses some experimental control. Ideally, a verification procedure (observer, videotape) should be added. Unfortunately, personnel limitations and confidentiality concerns prevented precise verification. The investigator relied upon a thorough procedural review with the cohort prior to the experiment and a conversation regarding the process following the experiment.

The study did not control for the medical conditions of group participants outside of a diagnosis for Stage IV AIDS.

The study did not control for the effect that the following may have had on participants: age, sex, race, height, weight, date of first diagnosis, last CD-4 count, current illnesses, sexual orientation, profession, medications presently taken, and self-reported stressors/stress level.

This study, because of the aforementioned limitations, should be viewed cautiously in regards to the generalizability of results.

CHAPTER II

REVIEW OF THE LITERATURE

Summary of the Rationale and Its Relationship to the Problem

The literature relevant to the rationale of this study falls into three broad categories for review: Psycho-social effects of HIV/AIDS, PNI, and Imagery.

HIV/AIDS: Information

To fully understand the population under investigation in this study, accurate information on HIV and AIDS will be reviewed. HIV is a retrovirus that gradually destroys the body's ability to defend itself by inhibiting cell and body functions that help with immunity. Specifically, HIV attaches itself to T-lymphocyte (CD-4) cells. The CD-4 cell is the activating mechanism in the immune system that alerts the white blood cells to attack a harmful pathogen or "intruder." As HIV destroys CD-4 cells, the body's abilty to dectect pathogens is compromised and the protective properties of the white blood cells are never mobilized. As a result, the HIV-positive individual is vulnerable to pathogens that are usually of no consequence to the person with uncompromised immune system. The CD-4 cell count is considered an accurate measure of the progression toward Stage IV AIDS. Because HIV challenges not only the physical health but also the mental well-

being of the infected individual, there is extensive information on HIV/AIDS in the psychological literature. There also exists a large body of information addressing the needs and care of the HIV-positive person (Breuer, 1991).

The most recent medical/biological information on AIDS and HIV in the psychological literature is in McCutchan "Virology, Immunology, and Clinical Course of HIV Infection"(1990) and Glasner and Kaslow The Epidemiology of Human Immunodeficiency Virus Infection (1990). Both articles contain important information on the virology of HIV and the course of AIDS. The McCutchan essay is especially suited for counselors because the author addresses possible therapeutic issues at each stage of a patient's illness. For example:

> For the preterminal patient, major issues are adjustment of goals and expectations of medical treatment, relief of pain and anxiety through reassurance and medications, marshaling emotional and physical support, and dealing with wills, power of attorney, and funeral and burial plans. (1990, p. 11)

Both of these sources detail the devastating effects the virus has on the human body; however, most non-medical treatment issues have already been explored in the PNI literature.

HIV/AIDS and PNI: Researching the Relationship

An early article addressing PNI and AIDS did focus on questions regarding the research role PNI may have in investigating the disease itself. Published in 1987, Solomon's article is essentially a "call to action" for PNI researchers to concentrate on AIDS. The author stressed that "AIDS is 'ideal' for study from a psychoneuroimmunologic frame of reference..."(Solomon, 1987, p. 629). Solomon also hypothesized that behavioral interventions (including imagery) should enhance immunity. He supported his hypothesis with evidence of immunoenhancement found in a study using hypnotic imagery as an independent variable. Another factor Solomon believed relevant to AIDS/PNI research relates to an individual's coping style, which he felt may positively influence a person's ability to extend survival. Solomon further explored the development of the coping style hypothesis in a co-authored study on long-term survival of people living with AIDS (Solomon, Temoshok, O'Leary, & Zich, 1987).

Solomon's work is significant for one lucid reason, the way he views the HIV-positive individual. Solomon frames the research problem as a figure and ground exercise. On analysis, his approach to AIDS research focused on ground (survival factors) rather than on figure (disease factors). By investigating survival factors in people with AIDS, Solomon extends beyond the medical profession's traditional research strategy of focusing

on the infecting virus alone. In his later 1987 study, Solomon reported that long-term survivors have certain coping skills that enhance their survival possibilities. He found in them a sense of personal responsibility regarding their health and a belief that one can influence personal health. The survivors take an active role in their treatment, neither passive nor defiant. These individuals also have personalized means of active coping and are sensitive to their bodies and psychological/physical needs (Solomon, et al., 1987). Solomon's hypotheses suggest the importance of coping styles as a PNI factor in long-term survival, and imply that enhancing coping skills may extend lives.

More recent research suggested that an active coping style may help deter the loss of immune cell function. The researchers reported that active coping skills as measured by several objective tests (Profile of Mood States, Coping Orientations to Problems Experienced, Life Experience Survey, etc.) were positively correlated to natural killer cell cytotoxcity (NKCC) (Goodkin, Blaney, Feaster, & Fletcher, 1992). The authors stated, "the major finding was that active coping style was positively associated with NKCC, independent of all other variables" (p. 643).

HIV/AIDS and Stress

The role of stress and HIV has also been investigated. In an article by Blaney, et al., the authors found that negative life events and positive social support are "direct predictors of

psychological distress during early HIV-1 infection" (Blaney, Goodkin, Morgan, & Feaster, 1991, p. 301). This observation is most significant "given the recent research showing that social support is related to the control of disease" (p. 303). In addition, they noted that "variables shown to influence psychological outcome in HIV-1 infection (such as negative life events and social support in the present study) may be fruitful intervention targets in efforts to enhance adjustment to HIV-1 infection and retard disease progression" (p. 303) Though the study focused on personality factors, the research underscores the theory that immunity enhancement is possible through an appropriate psychological intervention.

Another researcher in the field of PNI and HIV is Michael H. Antoni at the University of Miami Center for the Biopsychosocial Study of AIDS. His co-authored study "Psychoneuroimmunology and HIV-1" (1990) is an important work on PNI and its effect on the progression of HIV. The study stressed that early behavioral interventions may have physical and psychological impact on the HIV-infected individual. Antoni, et al. wrote, "we have noted significant benefits of behavioral interventions on psychological and immunological functioning among asymptomatic HIV-1 seropositive and seronegative gay men" (p. 46). In general, the researchers postulated that a psychosocial treatment regimen may have a desirable impact on (HIV-positive) individuals. Specifically, they suggested that such a treatment protocol may include

progressive muscle relaxation training, mental imagery, cognitive restructuring, assertiveness training, and social support sensitization/enrichment. However, most PNI research does not address HIV factors directly, but the studies do emphasize the impact psychological influences have on the human immune system.

Antoni also has investigated the relationship between stress and immunity. In 1989, Antoni, LaPerriere, Schneiderman, and Fletcher presented evidence that a 10-week program of aerobic exercise or psychosocial stress management buffered the psychological impact of notification of HIV seropositivity. The psychosocial intervention included relaxation training and cognitive stress management. Subjects in the psychosocial trial met twice weekly for 10 weeks. At the conclusion of the 10-week intervention period, researchers found significant increases in immunocompetence in both seropositive and seronegative subjects (Antoni, 1991b). Consequently, the authors concluded that psychosocial interventions may have a broader base of potential applications:

> If the interventions we are using can retard the progressive decrease in CD4+ number that normally accompanies the course of the disease, there is some likelihood that we may be able to retard the onset of symptoms in some patients. The immune enhancement that we have shown in HIV-1 seronegative gay men may

also enhance the health of individuals in this high risk group. (p. 42)

Antoni has investigated the effects of several other behavioral interventions. In a study of gay, HIV-positive men, he constructed an intervention that taught a variety of active coping strategies such as cognitive restructuring, relaxation exercises, and assertive responses (Antoni, 1991a). The intervention protocol centered around increasing perceptions of self-efficacy, personal control, and mastery. In addition, building and utilizing a social support network was an important part of the intervention. Antoni stated that psychosocial interventions "appear to offer promise in addressing the issues of loss of personal control, coping demands, social isolation, and depression--all salient for HIV-1-infected homosexual men" (Antoni, 1991a, p. 390). Regarding the intervention protocol's relationship to immunocompetence, Antoni reported that the "frequency with which HIV-positive subjects home-practiced their newly learned muscle relaxation skills was positively correlated" with immunocompetence (p. 391). The author concluded by stating that behavioral interventions may buffer disease progression in HIV-positive individuals.

In another study on PNI and HIV, Mulder and Antoni (1992) found further evidence that behavioral factors may effect the course of infection in HIV-1 infected individuals. The authors reviewed the existing body of literature on psychosocial correlates of immune status and disease progression in HIV-

positive homosexual men. Overall, the research supported the relationship between immunocompetence and a psychosocial intervention. However, the authors stated that "changes in immune parameters following an intervention, e.g., a rise in CD4 cells, do not necessarily have any relationship to disease progression" (p. 187). The researchers underscored the need for further PNI/HIV research, especially studies focusing on the clinical effects of PNI interventions.

Psychoneuroimmunology: Theoretical Constructs and Research

The theory, concepts, and terminology of psychoneuroimmunology can be best understood through several existing PNI literature reviews. Each review approached PNI in a similar fashion by researching the field's historical foundation, subsequent development, and future trends; in addition, PNI literature reviewers usually clustered studies by area of focus, such as immunology, stress, bereavement, etc. Consequently, a sizable and thorough analysis on PNI exists.

John B. Jemmott provides one of the earliest literature reviews on psychoneuroimmunology. In 1985, he wrote that "Psychoneuroimmunology represents a major shift in the thought about immunologic processes because traditionally the immune system has been viewed as largely autonomous, unaffected by the central nervous system" (Jemmott, 1985, p. 498). Jemmott traced the modern origins of PNI to 1936 with Hans Selye's "general adaptation syndrome" (GAS). Selye

challenged mind/body dualism with his view that stress is a state that can be inferred from specific physiological changes within an organism (Goodstein & Calhoun, 1982). Jemmott emphasized that although Selye had intimated that stress may influence susceptibility to certain diseases, no one proceeded with thorough research on the hypothesis.

Much of Jemmott's review highlighted the effects of external stress on immunocompetence, including a researcher from one study who found subjects who reported a great deal of life stress over a 12 month period had weaker lymphocytes than did subjects who reported little life stress (Jemmott, 1985). Jemmott also included studies on the effects of academic stress in his review. He found supporting data in four articles regarding the hypothesis that exam stress impairs certain immunological functions such as salivary IgA secretion rates.

In addressing the effects of PNI interventions, Jemmott found the greatest challenge in human studies is achieving the necessary high degree of experimental control. Despite this challenge, he believes quality PNI research can be conducted: "Greater emphasis can be placed on randomized experiments in which researchers identify a population under stress and use an intervention in an attempt to block the effects of stress on parameters of immunologic competence" (p. 505). Therefore, an experiment using HIV-positive subjects could be both a rational and reasonable endeavor according to Jemmott.

In a comprehensive review of stress and immunology literature, Ann O'Leary revealed empirical evidence demonstrating the link between emotions and the human immune system. The author's article provides a sound overview of immunology and the psychosocial factors that affect basic immune function. Her review included several articles both supporting and challenging the validity of using Immunoglobulin A (IgA) as an experimental dependent variable. On the IgA issue, she opined that the "debate may not be resolved in the near future" (O'Leary, 1990).

A significant section of O'Leary's article addressed the ability to enhance immunocompetence through psychosocial intervention. Overall, she found evidence of enhanced immune function in subjects trained in relaxation but no conclusive evidence supporting psychosocial intervention, and declared that further research was needed. When reviewing the studies conducting HIV/AIDS subjects, O'Leary offered that "evidence does exist for the influence of psychosocial factors on immune function in HIV-spectrum illness, although relationships may differ or be less reliable in this population" (O'Leary, 1990). She concluded that combined medical and psychological intervention may prolong life in HIV-infected individuals.

A subsequent literature review in 1991 was written by Lawrence Vollhardt. His article cited many of the sources found in O'Leary's work, but he also explored articles addressing other topics such as psychocutaneous disease (stress-related skin

disorders), neoplastic disease (cancer), AIDS, autoimmune disease, and included a comprehensive review of research on immunoenhancement.

Vollhardt cited evidence supporting social support, relaxation training, hypnosis, and exercise as possible benefactors for immunity and offered that "many studies have examined the effects of relaxation training on various subject populations and have generally found it to be effective in immunoenhancement" and concerning hypnosis wrote that "Direct shifts in immunomodulation have also been noted with mental imagery..." (Vollhardt, 1991, p. 44). The author concluded his review by stating that PNI is an infant field, but that "the role of PNI in prevention of and recovery from various diseases in an attractive one and may prove useful to a wide range of professionals working in the behavioral sciences" (p. 45). Vollhardt contributed defining PNI as a new frontier with a creditable empirical foundation and a promising future.

Kiecolt-Glaser and Glaser are frequently cited in PNI literature reviews as noteworthy researchers. Their early work, "Psychological Influences on Immunity," published in 1986, reviewed the relationship between depression, stressful life events and measurable changes in the immune system. The authors stated that "evidence indicates that more distressed populations are more susceptible to infectious disease and cancer" (Kiecolt-Galser, 1986, p. 622). Consequently, they deduced that reduction in stress may enhance immune function.

More importantly, the authors concluded their study with the following suggestion:

> Distress-related immunosuppression may have its most important consequences in individuals with preexisting decrements in immune function. Within this framework, at-risk groups may include older adults, individuals whose health is already impaired, patients with immunosuppressive diseases such as AIDS, or individuals who have been exposed to an infectious agent or carcinogen. It is possible that emotional distress may make some contribution to morbidity and mortality in these and similar groups. (p. 624)

Another PNI study addressed the relationship between object relations theory, and the immune system (McKay, 1991). According to this conceptual model, "object relation is generally understood to represent the residue within the mind of relationships with important people in the individual's life" (p. 641). Consequently, the representations of important people in one's past affect the outcomes one expects when relating and interacting with others. For example, a person with a positive internal representation who anticipates good outcomes from relationships tends to experience less stress and may have better health. McKay's research revealed a relationship between mistrust and poor immune function: "Under arousal conditions, object relations that were more benevolent than malevolent were associated with gains in S-IgA concentrations" (p.642).

This finding suggests that positive object relations may play a role in immunoenhancement.

Although human-subject research often lacks the strict controls of its animal-subject counterpart, extending PNI theory to human research has yielded encouraging results. In a study on immunity, stress, and the need for power in male prisoners, the researchers found that high power needs and high stress levels were associated with the highest levels of reported illnesses (McClelland, Alexander, & Marks, 1982). Studies on bereavement suggest that grief can impair an individual's immune system (Calabrese, Kling, & Gold, 1987).

As in animal research, the majority of human PNI studies focus on the impact that stress has on the immune system. Thackwray-Emmerson (1988) reports that "as early as the 1930s, stress was frequently linked with physiological changes" (p. 230). One study on academic stress found that during exam periods, test subjects had lower levels of a secretory antibody (Jemmott, et al. 1983). In a similar study, significant declines in immune cell activity were found in 75 medical students during final examinations (Kiecolt-Galser & Glaser, 1986). Psychological stressors may also play a role in the onset of cancer. Frequently observed precursors in cancer patients are stress-related events such as the loss of a significant other or a tendency toward hopelessness when facing a stressor (Thackwray-Emmerson, 1988).

Studies focusing on experimental immunomodulation also provide evidence supporting PNI theory. One study showed the effects of viewing a film on S-IgA levels (McClelland, 1988). McClelland and Kirshnit found that a film which aroused affiliation motivation was followed by an increase in S-IgA concentrations in subjects although a relationship between the film intervention and a reduction in reported illnesses was not seen. The authors established, "People showing consistent gains in S-IgA to the film are no more likely to have been less sick than other people" (p. 50). McClelland and Kirshnit concluded their study underscoring the need for further research on the relationship between IgA and susceptibility to infections. Their work may have been compromised by using college students as subjects because research has demonstrated the effects of academic stress on S-IgA (Jemmott, et al. 1983). The changes they measured might have been influenced by academic stress generated outside of the experimental treatment.

Jemmott and Magloire researched the relationship between academic stress, social support and S-IgA. In the study, the subjects who had reported lower levels of social support also had lower concentrations of S-IgA during an exam period (Jemmott & Magloire, 1988). However, a more interesting finding may be the more general effect that social support has on immunocompetence. The researchers discovered that subjects reporting more adequate social support during a preexam period had significantly higher S-IgA concentrations than subjects

reporting less social support. The authors stated that "This latter finding is consonant with the social support direct effects hypothesis, which states that social support enhances health outcomes irrespective of whether the individual is exposed to stressful experiences" (p. 803).

Even though the body of literature on S-IgA is compelling, the antibody is not universally accepted as the best measure of immunocompetence. The greatest criticism comes from Stone, Cox, Valdimarsdottir, Jandorf, and Neale (1987) who asserted that there are inconsistencies in S-IgA studies, and that the measurement of S-IgA concentrations is a source of variance within an experiment. For example, they observe that stimulating the production of saliva with a lemon-flavored candy can greatly influence the volume of IgA in the sample and skew the results. However, researchers who used S-IgA as a dependent variable have strongly defended the measure. In a reply to Stone, Cox, Valdimarsdottir, and Neale, researchers supporting IgA, Jemmott and McClelland (1989), countered "that there is no empirical or logical reason to reject the measurement of S-IgA in whole saliva and to prefer some other measure of immune competence" (p. 70). The authors emphasized that S-IgA is the predominant class in secretions and that the antibody provides a key initial defense against infection in the respiratory, intestinal, and urino-genital tracts. They went on to say, "Considerable evidence indicates that S-IgA antibodies interfere with bacterial and viral adherence to

mucosal surfaces and consequently limit colonization of these surfaces by pathogens" (p. 63). Jemmott and McClelland supported using S-IgA measures by performing a meta-analysis on 11 S-IgA studies. They asserted that "this meta-analysis clearly indicates that the combined evidence from psychoneuroimmunologic studies is consistent with hypothesized relations between psychosocial factors and S-IgA levels" (p. 65). On the other hand, Stone, et al. cited only four studies in their critique of S-IgA.

In addressing the criticism of variance inherent in S-IgA measures, Jemmott and McClelland cited evidence supporting the stability of S-IgA samples observing that Stone et al. provided no empirical evidence on the contrary (Jemmott & McClelland, 1989).

Pennebaker, Kiecolt-Glaser, and Glaser (1988) have also defended PNI interventions against criticism by Neale, Cox, Valdimarsdottir, and Stone who challenged the efficacy of brief psychotherapeutic writing therapies on immunocompetence. They demonstrated that having subjects write about their most traumatic experiences of their lives had been shown to reduce health center visits for illness. However, Neale, et al. noted loose experimental controls in the S-IgA studies they reviewed and questioned the existence of a treatment effect. In reply, Pennebaker et al. commented that the early findings had been replicated by three studies in two laboratories. Pennebaker et al. concluded by stating that they were "cautiously optimistic," and

that "this technique may affect immunocompetence in a positive way" (p. 639).

If we accept that S-IgA is an accurate gauge of immunocompetence based upon the evidence, then research using salivary immunoglobulin measures is noteworthy. Studies have demonstrated significant modulation in S-IgA levels after an intervention.

One study of S-IgA and daily relaxation provides evidence that a psychotherapeutic intervention can have on an individual's immune system. Green, Green, and Santoro discovered significant elevations in subject S-IgA levels after a 20-minute relaxation therapy experimental condition (1988). Twenty-four subjects were randomly assigned to a relaxation training group and 16 to a waiting list control group. Blood and saliva samples were taken as pretest/posttest measures of IgA, IgG, IgM, and S-IgA. In addition to the immunoglobulin dependent variables, subjects rated the severity of their stress-related symptoms on a 7-point scale. To evaluate the relationship between immunoglobulin levels, subjective distress, and self-reported loneliness, subjects were administered the Hopkins Symptom Checklist, the UCLA Loneliness Scale, and the Taylor Manifest Anxiety Scale. The subjects also rated their relaxation level on a 10-point scale at the end of each treatment session.

As stated above, S-IgA levels significantly increased after the 20-minute intervention; however, serum immunoglobulin levels did not change between the pre- and posttest blood

samples. When analyzed over a 22-day treatment period, there were significant increases in levels of serum IgA, IgG, and IgM. The authors concluded that there was a longer-term treatment effect in subjects who had practiced the intervention daily for three weeks and the serum measures supported the results found in the S-IgA samples, suggesting that relaxation may be an important coping skill to enhance immunocompetence in both short-term and long-term treatment strategies. Consequently, they emphasized that the intervention may be suitable for different applications: "the results indicate that relaxation has both rapid and longer-term effects on immune functioning" (p. 196).

Guided Imagery: Theorectical Constructs and Research

The immunoenhancement abilities of imagery techniques have been demonstrated in PNI literature. However, scant research has addressed the psychoimmuno-processes behind imagery; most articles focus on the outcomes of imagery interventions as evidence of efficacy. One author who has edited a book on imagination and healing is Anees A. Sheikh. In Imagination and Healing (1984), Sheikh brought together many authors who write on the relationship between health and imagery.

One theory, by Robert Ley and Richard Freeman, posits a relationship between imagery, cerebral laterality, and healing (Sheikh, 1984). The authors cited evidence that mental images

are conceptualized in the right hemisphere of the brain, the half of the brain characterized as a "holistic, gestalt, and simultaneous processor for which spatial relationships are most appropriate" (p. 53). Conversely, the left hemisphere is believed to be a logical, analytic, and sequential processor where language is based. Ley and Freeman emphasized that emotions appear to be largely the domain of the right hemisphere. They have based this belief on the empirical evidence citing the right hemisphere as the center of music and art although the authors posit that the right hemisphere does not necessarily enhance immunocompetence, but instead compensates for the immunosuppresant qualities of the left hemisphere. Ley and Freeman presented studies which indicated that norepinephrine and dopamine (the production of both of which is stimulated by the left hemisphere) may contribute to immunosuppression. Therefore, if the relationship between the cerebral hemispheres is one of reciprocal inhibition, then "engaging in imagery could activate the right hemisphere and thereby relatively inhibit activation of the left hemisphere" (Sheikh, 1984, p. 61).

A related hypothesis on the relationship between imagery and healing was explored by Vija Bergs Lusebrink (1990) in Imagery and Visual Expression in Therapy. The author reviewed a hemispheric laterality theory largely based on the work of Jeanne Achterberg. In essence, Lusebrink's theory states that the autonomic functions of the body are influenced by the right hemisphere, the site of mental images. Lusebrink noted that

"Verbal messages from the left hemisphere need to be translated by the right hemisphere into images before they can be understood by the autonomic nervous system" (p. 221). In addition, the author stated that images become part of the symbolic representation of emotions. Consequently, the images share the neuromuscular and neurophysiological components of emotions (Lusebrink, 1990).

Achterberg's early work on imagery was influential in shaping current PNI theory. In 1984 she reviewed the existing literature and found evidence supporting the brain/immune system link. Citing research showing the interconnection between the "image-laden" anterior frontal lobe and the limbic system, Achterberg suggested that "every image has a biochemical, neuroanatomic component with the potential for changing activities at the cellular level" (p. 6). In general, she believed that the reviewed studies were suggestive that imagery may be a precursive factor in physiological change. When the author addressed imagery and disease, she aligned with a theoretical framework based on the Triple Code Model by Ahsen. Achterberg wrote that the research she reviewed "support the Triple Code Model which considers the image to be the primary phenomenon, followed by the somatic response, and lastly by meaning or the lexical and verbal aspects" (p. 10). In the summary of her review, Achterberg emphasized that, "the gross relationship between the image and healing remains undisputed" (p. 11).

In addition to theory, there is empirical evidence supporting the effectiveness of guided imagery as an immunoenhancer. For example, a Danish study investigated the effects of relaxation and guided imagery on cellular immune function (Zachariae, Kristensen, Hokland, Ellegaard, Metze, & Hokland, 1990). For 10 days, subjects were daily given 1-hour of relaxation therapy and a combined guided imagery/relaxation procedure. The imagery intervention instructed subjects to visualize strengthening their immune systems. The pretest/posttest measure was a natural killer (NK) cell count. The results of the study supported the authors' hypothesis that the interventions would elevate NK cell counts. However, they cautioned, "the investigation does not indicate whether the rise in NK cell activity is due to relaxation, mental imagery, or both, and further studies should investigate possible differences between different psychological stimuli" (Zachariae, et al., 1990, p. 37). They concluded that their study reinforces the concept that the immune system is a cellular extension of the brain and that relaxation and imagery may bolster compromised immune systems.

An important study looked into the effect of immune system imagery on S-IgA (Rider et al., 1990). The research team, which included noted PNI author Jeanne Achterberg, created an experimental treatment of a 17-minute tape of imagery instructions with background music designed to enhance imagery. The imagery instructions focused on subjects

visualizing the activation of their immune systems.
Pretest/posttest measures of S-IgA were taken to assess the
treatment effect, and subjects were randomly assigned to one of
three groups: experimental (imagery/music), placebo control
(music), or control. The intervention was evaluated in three
separate trials over a 6-week period. The results indicated that
the experimental treatment significantly ($p < 0.05$) increased
subject S-IgA levels and confirmed that immunoenhancement
could be accomplished with a 20-minute taped guided imagery
intervention.

Another study involved the combination of guided imagery
with familiar-sedative music (Russell, 1992). Russell's study
explored techniques to reduce anxiety in university students.
The author compared three different interventions, alone and in
combination: cognitive-behavioral, relaxing music, and guided
imagery. Russell used a number of anxiety measures as the
dependent variables: a self-report scale, the State Trait Anxiety
Inventory, and an electromyography (EMG). One combination
approach was found to be more effective: music teamed with
guided imagery. The author remarked, "The results of this study
indicate that highly anxious university students, using music and
imagery techniques, may have an effective and alternate method
for reducing state anxiety" (p. 521). The author suggested that
music may act as a catalyst in enhancing the mental image.
Citing an earlier study that demonstrated music as a facilitator
for the production of guided imagery, Russell also suggested that

imagery plus music may have been seen as a new treatment method by the subjects that "would assist them in coping with overall life stressors" (p. 521).

CHAPTER III

METHODOLOGY

<u>The Sample</u>

The sample consisted of 24 volunteers with Stage IV AIDS recruited from an on-going HIV care program in Virginia. The sample was all-male, but diverse in age, race, height, weight, date of first AIDS diagnosis, most recent CD-4 count, and current illnesses. All participants were from Central Virginia. Sixteen participants were Caucasian, and the remaining eight were African-American. The mean age of the participants was 32.54 years (range 21 to 47). The mean number of years living with HIV infection was 4.5 (range 1 to 9). The original intent was to obtain 30 individuals from several AIDS service organizations, but this proved problematic in maintaining experimental control. Instead, a smaller sample allowing for tighter experimental control was made available through resources in the medical profession. Initial contact was made through several health providers specializing in the treatment of HIV. Volunteers were recruited from an AIDS treatment program monitored by a Physician at the Medical College of Virginia (MCV) after a thorough review of the study proposal. Twenty-five individuals originally volunteered, but one had to withdraw prior to the experiment for health reasons. Participants provided written consent and were randomly assigned to either the experimental or control group. All

participants were given general information about the experiment and their right to withdraw at any point in the study. Follow-up counseling regarding the experiment was offered to all participants by the principal researcher, a trained mental health therapist. The volunteers were informed of the purpose of the study and the control group-assigned participants were offered experimental treatment at the conclusion of the data collection.

Materials and Equipment

A vocal guided imagery script was recorded on a high-quality audio cassette tape. The tape was approximately 25 minutes of relaxation and immune system guided imagery (Appendix C). The use of metaphorical language was used to enhance immunity in the listener. The basic structure of the intervention was based on a relaxation audiotape developed by the University of California, San Francisco AIDS Health Project (1985).

Medical History Questionnaire

Information was obtained to assess physical status and the medication background on each participant. Questions on height, weight, sex, age, were asked, in addition to any information on HIV-related opportunistic infections. Participants were asked to list any prescription drugs they were taking at the time of the data collection. All participants

completed the questionnaire. All questionnaires were coded with the last six digits of the participant's Social Security number.

Secretory IgA (S-IgA)

Secretory IgA measures were used because the method of obtaining saliva is unobtrusive and the procedure has demonstrated effectiveness as a short-term measure of immunocompetence (Rider, 1990). A sample of whole unstimulated saliva was obtained from each participant at timed intervals of 0, 60, and 120 seconds and subsequently frozen. Using timed samples helped control for the relationship between S-IgA concentrations and saliva volume (Jemmott III & Magloire, 1988). To control for artificially stimulated saliva, the use of substances such as tobacco, chewing gum, and candy was discouraged at least one hour prior to sample collection. Participants, however, were not told to abstain from eating regular meals prior to the sample collection. All samples were collected using universal precautions for handling body fluids in accordance to the Virginia Department of Labor and Industry directive 1910.1030 regarding occupational exposure to bloodborne pathogens. Samples were collected and handled by a licensed healthcare professional. Saliva samples were coded by the last six digits of the participant's Social Security number. In order to minimize bias, the primary investigator neither administered the treatment condition nor collected the

samples. Thawed saliva samples were assayed by a single radial Immunodiffusion (RID) by a biologist and the primary investigator (Garvey, Cremer, & Sussdorf, 1977). S-IgA measures using RID has been supported in the literature as a valid and reliable procedure (Green et al. 1988; Jemmott & Magloire, 1988; Jemmott & McClelland, 1989; McClelland & Kirshnit, 1988; Rider et al., 1990).

The assay procedure was modeled after the study of Rider et al. (1990). Equal volumes of sample saliva were placed in cylindrical wells punched in an agar plate treated with anti-human-IgA. Over a 24-hour period, the saliva diffused in the agar, and the antiserum formed a disk-shaped immune precipitate with the IgA protein for which it is specific. All other proteins freely diffused (Rider, 1990). The area within the ring was measured as the diameter squared. This area measurement is proportional to the antibody concentration (Garvey, Cremer, & Sussdorf, 1977) (McClelland & Kirshnit, 1988) A reference concentration of IgA provided a standard to check for possible deterioration of each agar plate.

Research Design

A pretest/posttest control group design was used. This design allowed for a comparison of the experimental group to the control group. The participants were randomly assigned to one of two conditions: immune system guided imagery, or control.

| G$_1$ | R | O$_1$ | X | O$_2$ | O$_3$ |
| G$_2$ | R | O$_1$ | | O$_2$ | O$_3$ |

G= Group   R= Random assignment   O$_1$= Pretest observation

O$_2$= Posttest observation (immediate)

O$_3$= Posttest observation (14 days after treatment)

X= Treatment

Procedure

All participants were briefed on the general purpose of the study and confidentiality issues. At the conclusion of the briefing, volunteers were asked to review and sign a Subject's Rights/Permission Slip (Appendix A); the slip was read aloud by the sample collector to help ensure complete understanding. Volunteers were only identified by the last six-digits of their social security number on all materials and samples collected. After signing the Subject's Rights/Permission Slip, participants completed the MedicalHistory Questionnaire (Appendix B).

Participants were randomly assigned to one of two groups: Group G$_1$ received the guided imagery intervention; Group G$_2$ was the non-treatment control group. A pretest saliva sample was taken from each participant just prior to the administration of the treatment procedure. Participants in Group G$_1$ were placed in a comfortable room where they were asked to follow the directions given on the audio tape. Group G$_2$ received no treatment. At the conclusion of the treatment or control condition (30 minutes), a posttest saliva sample was obtained

from each participant. To control for the influencing effects of mortality, history, and maturation, the entire experiment for each group took place at one meeting within a 90 minute time span. Two weeks following the first pre- and posttest sample collection, a second posttest was collected to measure long-term effects of the guided imagery treatment on the immune system. All control participants were given the option to receive the treatment. Counseling services were made available for any participants who requested experimental desensitization.

Data Analysis

To determine statistically significant differences ($\alpha = .05$) between groups, an analysis of covariance (ANCOVA) was calculated on the collected data.

Specific Null Hypotheses

Null Hypothesis 1

Ho_1: HIV-positive participants administered guided imagery will not have significantly different S-IgA concentrations immediately following treatment compared to control HIV-positive participants.

Null Hypothesis 2

Ho_2: HIV-positive participants administered guided imagery will not have significantly different S-IgA concentrations

two weeks following treatment compared to control HIV-positive participants.

Ethical Safeguards and Considerations

Ethical safeguards were in accordance with the American Psychological Association guidelines. The experiment was reviewed and approved by the School of Education and the College of William & Mary Human Subjects Research Committees. In addition, access to the participants was gained after the experiment was reviewed and approved by an internist providing health care to patients with HIV. Confidentiality of participant identity and scores were maintained by strict access control to collected data. Only the investigator and the assisting biologist saw the pre/posttest measures. In addition, saliva samples were obtained and matched via the last six digits of the participant's social security number. All treatment conditions were administered from an audiotape to assure consistency of treatment and reduce experimenter influences. The right of a participant to withdraw from the experiment at any time was outlined in the permission slip that was read and signed by all participants. All briefings, treatment administration, and sample collection was conducted by a licensed health care professional (Registered Nurse). At the completion of the posttest, all participants were debriefed and subjective comments they may have had were collected regarding their impressions of the experiment. The results of the experiment were made available

to all participants at the conclusion of the data analysis and interpretation.

Summary of Methodology

The sample consisted of 24 HIV-positive volunteers recruited from an on-going HIV care program in Virginia. The sample was all-male, but diverse in age, race, height, weight, date of first AIDS diagnosis, most recent CD-4 count, and current illnesses. Participants provided written consent and were randomly assigned to either the experimental or control group. All participants were given general information about the experiment and their right to withdraw at any point in the study. Follow-up counseling regarding the experiment was offered to all participants by the principle researcher, a trained mental health therapist.

The volunteers were informed of the purpose of the study and the control group-assigned participants were given the option of experiencing the experimental treatment at the conclusion of the data collection.

The entire experiment spanned January 8, to January 22, 1996. Participants were randomly assigned to the experimental or control group. At the first meeting, participants completed the Medical History Questionnaire (Appendix B), gave their pretest saliva sample, received the intervention or control condition, and gave their posttest saliva sample. The first meeting was 90 minutes long. Collected saliva samples were

frozen until the RID assay. Fourteen days following the first meeting, participants provided a second posttest saliva sample. Interested control group participants were administered the intervention upon their request immediately following the second posttest saliva collection. The second meeting lasted 20 minutes for experimental group members and 20-90 minutes for control group members depending the individual's desire to experience the treatment condition.

The research design used in this study was the Pretest/Postest Control Group design. The statistical procedure used to test the null hypotheses was the analysis of covariance. Two null hypotheses provided the basis for determining a significant difference ($\alpha = .05$) between measures.

CHAPTER IV

RESULTS

The results of the experiment are reviewed and interpreted by hypothesis in this chapter. The data collected and analyzed for the dependent variable was a participant's pre- and posttest IgA levels. An analysis of covariance (ANCOVA) was calculated to reveal any evidence of statistically significant differences between the control and experimental groups after treatment (posttest) taking into account pre-treatment group differences (pretest).

Specific Research Hypotheses

Hypothesis 1

H$_1$: HIV-positive participants administered guided imagery will have significantly elevated S-IgA concentrations immediately following treatment compared to control HIV-positive participants.

An ANCOVA of pretest data to the posttest data collected immediately after the treatment resulted in an F of 5.68 for treatment main effects (Table 1). This was determined to be significant at the .003 level. Therefore, the null hypothesis was rejected; IgA posttest means among groups were statistically different. Table 2 summarizes the means and standard deviations by group. In order to make a post hoc analysis

between group means, a Newman-Keuls (Glass & Hopkins,

1984) method of multiple comparisons was calculated. (Table 3).

Table 1
Hypothesis 1
Summary of ANCOVA Analysis for Treatment Effects
of Post-(Immediate) with Pretest Total IgA Measures

Source	df	Sum of Squares	Mean Square	F-test	P value
Between subjects	11	11866.41	1078.76	6.85	.0001
Within subjects	36	5668.03	157.45		
treatments	3	1930.47	643.49	5.68	.003
residual	33	3737.55	113.26		
Total	47	17534.43			

Reliability Estimates for All treatments: .85   Single Treatment: .59

Table 2
Hypothesis 1
Summary of Means, Standard Deviations and Standard Errors

Group	n	Mean	Std. Dev.	Std. Error
Control Posttest	12	113.83	17.72	5.12
Exp. Posttest	12	129.62	18.70	5.40
Control Pretest	12	114.76	17.55	5.07
Exp. Pretest	12	117.12	21.14	6.10

Table 3
Hypothesis 1
Summary of the Newman-Keuls Method of Multiple Comparisons

Ordered Means

Post.exp	Pre.exp	Pre.con	Post.con
129.62	117.12	114.76	113.83

Comparison:	q value:		Table q:
Post.exp vs. Post con	4.36*	$p < .05$	$.95^q 30, 4 = 3.84$
Post.exp vs. Pre.con	4.10*	$p < .05$	$.95^q 30, 3 = 3.49$
Post.exp vs. Pre.exp	3.45*	$p < .05$	$.95^q 30, 2 = 2.89$
Post.con vs. Pre.exp	0.91	$p > .05$	$.95^q 30, 3 = 3.49$

Hypothesis 2

H_2: HIV-positive participants administered guided imagery will have significantly elevated S-IgA concentrations two weeks following treatment compared to control HIV-positive participants.

An ANCOVA of pretest data to the posttest data collected 14 days after the treatment resulted in an F of .45 for treatment main effects (Table 4). This was determined to be significant at only the .7168 level. Therefore, the null hypothesis was accepted. Fourteen days following treatment, the IgA posttest means among groups were not statistically different. Table 5 summarizes the means and standard deviations by group. Table 6 summarizes the post hoc analysis between group means using the Newman-Keuls method of multiple comparisons.

Table 4
Hypothesis 2
Summary of ANCOVA Analysis for Treatment Effects
of Post (Delayed) with Pretest Total IgA Measures

Source	df	Sum of Squares	Mean Square	F-test	P value
Between subjects	11	12069.85	1097.26	8.79	.0001
Within subjects	36	4493.94	124.83		
treatments	3	177.79	59.26	.45	.7168
residual	33	4316.15	130.79		
Total	47	16563.79			

Reliability Estimates for All treatments: .89   Single Treatment: .66

Table 5
Hypothesis 2
Summary of Means, Standard Deviations and Standard Errors

Group	n	Mean	Std. Dev.	Std. Error
Control Posttest 2	12	116.21	17.79	5.13
Exp. Posttest 2	12	120.03	20.45	5.90
Control Pretest	12	114.76	17.55	5.07
Exp. Pretest	12	117.12	21.14	6.10

Table 6
Hypothesis 2
Summary of the Newman-Keuls Method of Multiple Comparisons

Ordered Means
Post.exp   Pre.exp   Post.con   Pre.con
120.03   117.12   116.21   114.76

_____

Comparison: q value: Table q:

Post.exp vs. Pre con   1.63 $p > .05$ .95q 30, 4 = 3.84

Summary

The pretest/posttest control group research design was chosen to determine the efficacy of immune system guided imagery on enhancing the S-IgA levels in HIV-positive individuals. The sample was drawn from volunteers belonging to an on-going AIDS support group in Central Virginia. Collected data was examined using an analysis of covariance (ANCOVA) resulting in the rejection of the null hypothesis 1 and the acceptance of the null hypothesis 2.

At the 0.05 level of significance:

H_O1: HIV-positive participants administered guided imagery will not have significantly elevated S-IgA concentrations immediately following treatment compared to control HIV-positive participants.

H_O2: HIV-positive participants administered guided imagery will not have significantly elevated S-IgA concentrations 14 days following treatment compared to control HIV-positive participants.

When the Newman-Keuls method of multiple post hoc comparisons was employed on hypothesis 1 data (treatment effect immediately following intervention), a significant difference was found between the posttest means of the experimental and control groups ($p < .05$). In addition, the

posttest experimental group mean was significantly different from the pretest control group mean ($p < .05$). When comparing the experimental group pre and posttest means, significant difference was also found.

A post hoc analysis of hypothesis 2 data (treatment effect 14 days following intervention) revealed no significant differences group means ($p > .05$).

CHAPTER V
SUMMARY, CONCLUSIONS, DISCUSSION and
RECOMMENDATIONS,

Summary

The primary purpose of this study was to determine the efficacy of a psychoneuroimmunological intervention on immunocompetence in people with compromised immune systems resulting from HIV infection. Medical science has shown that S-IgA provides an initial defense in the oral cavity against potentially harmful pathogens (Tomasi, 1976). We do know that males with low levels of S-IgA are more likely to have respiratory tract infections than males with higher levels of S-IgA (McClelland, Alexander, & Marks, 1982). People who are infected with HIV have impaired immunity and are at-risk for many opportunistic infections. If HIV-infected individuals could enhance their immunity through either medical or psychological intervention, they would be more resistant to opportunistic disease. Though a core of research has demonstrated immune system modulation through psychological techniques, none has investigated a technique with an HIV-positive sample. Specifically, S-IgA levels have been shown to change when an individual is visually stimulated (McClelland & Kirshnit, 1988). Research on anxiety reduction using music and guided imagery

has demonstrated that auditory-based interventions can alter S-IgA levels in college students (Russell, 1992).

The secondary purpose of this study was to investigate whether one treatment of an intervention would have any lasting enhancement of an individual's immunity. In 1987, Solomon underscored this question within the larger context of increased survival rates. The researcher also asked whether the central nervous system could "mediate 'compensatory' mechanisms for the immunodeficiency induced" by HIV (p. 633). If an intervention could "train" such mechanisms, long term benefits might include increased disease resistance in an individual.

This study investigated the effect of one specific psychoneuroimmunological intervention on S-IgA levels in HIV-positive individuals. A guided imagery intervention stressing the activation of the participant's immune system was chosen as the experimental treatment. Guided imagery has demonstrated efficacy in reducing stress, is easily administered, and is minimally invasive. It was hypothesized that participants in the imagery experimental group would have significantly higher S-IgA levels than those in the control group. In theory, the elevated S-IgA levels would then enhance the experimental group participants' resistance to respiratory infection. However, the actual relationship between the treatment and a participant's overall health was not investigated in this study.

Guided imagery as an immunoenhancer of lasting benefit was the second hypothesis of the study. To isolate a

psychological intervention that "re-educates" the compromised immune system in an HIV-positive person would be a noteworthy accomplishment. The investigator felt that an immune system-guided imagery exercise might establish "compensatory" immune responses under conscious control to replace the HIV-damaged responses that are unconscious.

The sample, consisting of 24 HIV-positive male volunteers, were recruited from an on-going HIV support network. All participants were from Central Virginia. Sixteen participants were Caucasian, and the remaining eight were African-American. The mean age of the participants was 32.54 years (range 21 to 47). The mean number of years living with HIV infection was 4.5 (range 1 to 9). The participants were randomly assigned to either the experimental or control group. Participants participated in the study for a total 14 days.

The intervention and data collection took place on two days for a total of 2.5 hours of contact time. On the first day, participants completed demographic questionnaires, permission statements, received experimental or control condition, and provided pre- and first posttest saliva samples. Fourteen days later, the second posttest saliva sample was collected from each participant; control group participants were offered the experimental treatment after the second posttest sample collection. Eight of the 12 control participants requested the experimental treatment.

The research design used was the pretest/posttest control group design. The dependent variable was S-IgA levels as determined by radial immunodiffusion. An analysis of covariance was used to discern differences in group means by taking into consideration pre-treatment group differences. As reviewed in Chapter 4, statistical analysis resulted in the rejection of the null on hypothesis 1 and the acceptance of the null on hypothesis 2 at the .95 level of confidence. The group means differed significantly on the posttest immediately following the intervention.

Post hoc multiple comparison revealed significant differences between the pretest and posttest means of the experimental group. This finding suggests that immune system guided imagery affects S-IgA levels because no significant difference was found between the pre- and posttest means in the control group. There were significant differences also between the posttest means of the experimental and control group. However, no significant differences were found between the pretest means of the experimental and control group, suggesting that the groups were equal prior to treatment. The final post hoc comparison of the samples collected immediately following treatment revealed a significant difference between the posttest mean of the experimental group and the pretest mean of the control group. In light of there being no differences between the groups on the pretest means, this difference is likely the result of the treatment on the experimental group.

To examine the longitudinal impact of guided imagery on S-IgA levels, an analysis of covariance on the follow-up posttest was used. The results demonstrated no differences between groups 14 days following the intervention. This finding suggests that from a single guided imagery intervention, lasting change in S-IgA levels is not likely. In addition, a post hoc multiple comparison analysis between groups found no significant differences between groups.

Conclusions

The following conclusions were drawn from this study.

1. Immune system guided imagery appears in this study to enhance S-IgA levels in HIV-positive males.

2. The ability of immune system guided imagery to enhance S-IgA levels appears to be of short duration.

3. Individuals with compromised immune systems can enhance S-IgA levels through immune system guided imagery.

4. An audiotaped intervention appears to enhance S-IgA levels, though it is not known whether a "live" intervention is more effective.

5.   Administering immune system guided imagery
       in a group setting appears to enhance S-IgA levels.

6.   Generalizability of results should be limited to
       HIV-positive males. No data was collected on
       HIV-positive females.

Discussion

This study demonstrated that immune system guided imagery does influence the S-IgA levels in HIV-positive men. The guided imagery treatment was shown to be statistically superior to no treatment. However, the benefits of the treatment appear to have little long term effect on S-IgA levels. The limited duration of the treatment effect may be affected by having only one intervention session.

It has been found that daily relaxation will modify both salivary and serum immunoglobulin levels. For example, the study by Green, Green, and Santoro (1988) used a 3 week practice period to instruct participants on proper relaxation techniques. They found significant differences between their experimental (practice) and control (no practice) groups. The researchers deduced a long-term practice effect in participants who had employed relaxation once a day for 3 weeks. Though relaxation therapy and immune system guided imagery are different techniques, a similar long-term practice effect may impact the duration of imagery. Until practice effect is studied

with immune system-guided imagery, daily imagery exercises may have implications for health by decreasing susceptibility to upper respiratory illness.

The precise effective mechanism behind immune system guided imagery is not understood, nor was it revealed in this study. Whether other forms of guided imagery would bring about the same change in S-IgA levels is unknown. It is also possible that the experimental participants responded to the treatment as a relaxation and/or stress intervention. Antoni, LaPerriere, Schneiderman, and Fletcher (1991) had found that "stress management interventions can buffer the psychological distress of receiving a positive HIV-1 diagnosis and can modestly elevate the values of some immune parameters in HIV-1 seropositive individuals" (p. 42).

For individuals living with HIV, overall psychosocial stress levels are high, especially those who are asymptomatic (Chuang, Devins, Hunsley, & Gill, 1989). It appears that the early stages of HIV infection may introduce threatening stressors, such as uncertainties, fear of pain and suffering, isolation, physical deterioration, and loss ability to perform/respond sexually. Chuang, Devins, Hunsley, and Gill found that individuals living with AIDS face different stressors such as issues of death, dying, and the resolution of unfinished business. The participants used in the present study all were diagnosed with AIDS having CD-4 counts below 200. All had a medical history of at least one opportunistic infection. From the research by Chuang, Devins,

Hunsley, and Gill, it is likely that this study's subjects were not experiencing the highest levels of distress related to HIV-infection. Consequently, the immune system guided imagery may have been activating more than a relaxation response in the participants.

It is known that an active coping style is associated with enhanced immune functioning in HIV-positive men (Goodkin et al., 1992). An active coping style is marked by optimism, hope, and empowerment, whereas a passive coping style focuses on pessimistic, hopeless, and overly cooperative attitudes. Passive coping styles have been associated with many illnesses which may be linked to immune system dysfunction, such as cervical cancer (Goodkin, Antoni, & Blaney, 1986) and breast cancer (Pettingale, Greer, & Tee, 1977). AIDS and cancer are similar diseases in both symptomology and progression. One research team suggested that a variety of personality factors were associated with unfavorable prognostic indicators for cutaneous malignant melanoma (Temoshok et al., 1985). They stated that a Type C coping style is associated with unfavorable prognostic indicators. The Type C individual is usually passive, helpless, other-focused, inexpressive of emotions, and appeasing. Conversely, the same team identified the Type A personality as more aggressive, self-involved, hostile, and impatient. Solomon (1987) emphasized that future PNI research should focus on Type A individuals and their dominance in the ranks of long-term survivors of AIDS.

Since HIV-positive individuals with active coping styles and/or Type A personalities assert more control over their disease and its treatment, they may find immune system guided imagery to be an effective tool. Guided imagery as a technique may also enhance a person's overall health outside of direct immune system stimulation. Gloersen et al. speak of a philosophy of coping well with AIDS which emphasizes calm, peace, or having a sense of control over one's disease (1993). Others have commented on the inner power people can assert to increase their survival when living with AIDS. In a care manual published by the Los Angeles AIDS Project (Moffatt, 1987) Bernie Siegel comments on the characteristics of a long-term survivor:

- Aimless playfulness for its own sake

- Keeping a positive outlook and confidence in the face of adversity

- An active imagination, daydreams, mental play and conversations with yourself
  (p. 16)

Immune system-guided imagery does focus on imagination, mental play, and the principle of an internal locus of control. An external locus of control and longterm AIDS survivorship have been shown to be negatively correlated (Remien, Rabkin, & Williams, 1992). Researchers found that longterm survivors had a significantly greater belief in chance or internal factors influencing their health than a belief in "powerful others."

Although an audiotaped immune system-guided imagery exercise increases S-IgA and may enhance one's sense of personal control over HIV, the social support obtained from a group process activity should not be ignored. The imagery intervention in this study was administered to an ongoing facilitated AIDS support group. It is unclear whether an individually administered intervention would have affected participant S-IgA levels as did the group administration model used. However, this study's demonstration of the efficacy in using an audiotaped intervention may have more practical significance when considering the over-taxed time, personnel, and financial resources of most AIDS service organizations.

It is known that lack of social support is a strong predictor of psychological distress (Blaney, Goodkin, Morgan, & Feaster, 1991). Research has also demonstrated that social support is related to the control of chronic disease (Kaplan & Hartwell, 1987). A compelling example of the role social support may play in survivor rates was demonstrated by Speigel, Bloom, Kraemer, & Gottheil (1989) in a longitudinal study of breast cancer patients. The research team hypothesized that women placed in therapeutic support groups would suffer less distress than women not receiving such treatment. The researchers were attempting to improve the quality of life for breast cancer patients; the hypothesis was supported as group participants reported improved quality of life. The team conducted a follow-up study 10 years after the groups had disbanded to see how

long the participants had survived. The records indicated that the women in the support groups had survival rates twice as long as the control group. On average, 18 months were added to the lives of support group members which exceeds what could be expected from cancer medications at the advanced stage in the participants' disease. Providing scheduled, consistent immune system-guided imagery exercises in a group setting may prove to be highly effective in enhancing immunity and reducing social isolation in HIV-positive individuals. The combination of the internal mental process coupled with external social support may produce complex interactions between people and their environment.

Though this study did not reveal a panacea in the therapeutic treatment of people living with AIDS, the results did indicate that immune systems can be manipulated through targeted guided imagery. Significantly, the investigator found this effect in men with severely compromised immune systems. Though the enhancement of immunity was of short duration, several considerations might address this therapeutic limitation. First, training and repeated practice of basic imagery skills may strengthen an individual's ability to invoke effective mental images. Second, comprehensive coaching and instruction on the immune system-guided imagery exercise may increase the therapeutic effect on a person's immune system. Third, consistent, scheduled "maintenance" imagery group sessions may lengthen the duration of the treatment effect. Finally,

training in individual guided imagery with the use of an audiotape or self-guidance provides a self-administered tool to the HIV-positive person.

Giving HIV-positive individuals a self-administered intervention may empower them with a greater sense of control over their health. Perhaps the most powerful point from this study is not the empirical observation of an enhanced immune system, but rather the suggestion that immune system-guided imagery may reinforce a person's feelings of hope and control in fighting a disease that trys to steal away these vital qualities. A core condition of human existence is the personal capacity to exercise freedom in affecting ourselves and others. Unfortunately, HIV restricts and can even destroy this freedom. Offering HIV-positive individuals a therapeutic tool for enhanced immunity underscores their freedom to fight AIDS. Significantly, it was the participants who enhanced their immunity in this study, not an audiotape. Immune system-guided imagery only facilitated the participants' freedom to control their bodies and, perhaps, their future.

Recommendations

The following recommendations are made based upon the findings of this study:

1. It is recommended that this study be replicated with a larger sample to include HIV-positive women.

2.   It is recommended that research be developed to
     determine the effective duration time of immune system-
     guided imagery on enhancing S-IgA.

3.   It is recommended that longitudinal research using
     psychoneuroimmunological interventions be conducted
     to determine the actual correlation between PNI
     interventions and health (e.g. survival rates, incidence of
     infection, T-cell counts, etc.)

4.   It is recommended that health care providers consider
     including immune system-guided imagery to their HIV
     treatment protocol.

5.   It is recommended that HIV therapeutic support groups
     consider including immune system-guided imagery in
     their sessions.

6.   It is recommended that repeated practice or training
     with immune system-guided imagery may increase
     and prolong the treatment effect. Additional research
     is needed to investigate the impact of practice effect on
     this intervention.

7.   It is recommended that immune system-guided imagery
      supplement and not replace existing social support models
      being used by health care providers.

Appendix A

Guided Imagery as a Psychoneuroimmunological
Intervention for HIV-positive Individuals

CONSENT FORM

I, _____, am willing to participate
in a study of individuals who have been diagnosed HIV-positive. I
understand that this study is being conducted by Mr.
Christopher D. Keene, a doctoral candidate in counseling at the
College of William & Mary.

As a participant in this study, I am aware that I will be involved
in the following procedures:

1. I will complete a brief medical history questionnaire.

2. A saliva sample will be taken from me at the beginning and
   conclusion of a 45 minute treatment session.

3. I will be randomly assigned to one of two different
   types of treatment.

As a participant in this study, I am aware that I may choose to
withdraw at anytime during the experiment. I may also choose
to be administered the alternative treatment at the conclusion of
the study. In addition, I may request debriefing counseling from
Mr. Keene at the conclusion of the study. I also understand that
a written summary of the results of this study will be mailed to
me upon request, and by doing so, I waive my right of anonymity
to Mr. Keene.

By participating in this study, I understand that there are no obvious risks to my physical or mental health.

Confidentiality Statement

As a participant in the study, I am aware that all records will be kept confidential. I will be identified only by the last six digits of my social security number.

I fully understand the above statements, and do hereby consent to participate in this study.

_____
Participant's Signature

_____
Witness's Signature

_____
Date

Appendix B

Medical History Questionnaire

Last 6 digits of SSN

Height _____   Weight _____   Sex _____   Age _____

Race _____ (for demographic purposes)

1. Approximate date first diagnosed HIV-positive:

2. List history of opportunistic infections if applicable:

3. List any present HIV-related symptoms:

4. When was your last CD4 count taken and what was the result?

5. List any presently prescribed medications:

6. List any medications taken today:

7. When was the last time you used a tobacco product?

8. List and describe any counseling you have received in the last three months (ex. Group-HIV support, Personal-relationship issues, Personal-career issues, etc.)

9. Have you ever received guided imagery therapy or hypnosis?

10. How would you describe your general state of health?

1	2	3	4	5
Bad	Poor	Average	Good	Excellent

11. How would you describe your present stress level?

1	2	3	4	5
High	Moderate	Average	Low	Very Low

12. List and describe any recent (last two months) stressful life events (ex. death in family, health diagnosis, relocation)

13. Describe any personal strategies for managing stress if applicable (ex. therapy, exercise, meditation, reading)

Appendix C

IMMUNE-SYSTEM GUIDED IMAGERY MODEL
(slowly paced for 20-25 minutes)

Let's begin in a sitting position, feet flat on the floor, arms by
your side, and palms in your lap. Close your eyes, take a deep
breath, and slowly release the air through your mouth. As you
do, feel the tension flow out of your body. Repeat this several
times.

REFLECTIVE TIME

Keeping your eyes closed and breathing normally, I want you to
tell yourself that you are going to have a pleasant experience.
Focus on your breathing and how your body responds to each
inhalation and exhalation. You are feeling peace, comfort, and
relaxation.

REFLECTIVE TIME

Keeping your eyes closed and breathing normally, I want you to
focus on the cycle of breathing, at how inhalation and exhalation
are connected. Visualize your breathing as a loop. Now focus at
the point that inhalation becomes exhalation. At that moment,
there is peace.

REFLECTIVE TIME

Keeping your eyes closed and breathing normally, focus on this
feeling of peace and relaxation. Feel this warm, relaxed feeling
travel from your feet, to your legs at your next exhalation. At
your next exhalation, feel the relaxation travel from your legs to
your torso. At your next exhalation, feel the relaxation travel
from your torso to your chest. At your next exhalation, feel the
relaxation travel from your chest to your neck. At your next
exhalation, feel the relaxation travel from your neck to your face
through to the top of your head. Experience this deep sense of
relaxation...this sense of peace.

REFLECTIVE TIME

Keeping your eyes closed and breathing normally, visualize
removing any stress that remains in your body, experience the
relaxation...experience the peace. Now as you feel this deep

sense of relaxation, visualize yourself without stress, without tension, without discomfort or pain.

REFLECTIVE TIME

Keeping your eyes closed and breathing normally in this state of deep relaxation, visualize traveling inside your body. Flow through the inner space of your body. Using your mind's eye, explore your body...you see cells flowing around you. Travel with these cells through your body, you visit your heart, your lungs, your brain. In these cells flowing around you, you can see the life force they possess. Notice the nutrients, the oxygen... they bring strength and life to your body. Relax and flow with these life-givers to your body. Visualize your body's guardians amongst these cells. They protect and fight against harmful invaders that try to harm you. As you flow with your guardians, visualize yourself calling them together...imagine having the power to increase their number by simply thinking it. Visualize yourself swimming with these cells and everywhere you look the guardians become stronger and greater in number. As you experience this relaxation, these guardians strengthen.

REFLECTIVE TIME

Keeping your eyes closed and breathing normally, take a moment to experience your deep relaxation and peace. Visualize an army of guardians growing within your body.

REFLECTIVE TIME

Keeping your eyes closed and breathing normally, visualize yourself leading this army of guardians in your body. Relax and flow through your body. Using your mind's eye, look for harmful invaders that you may encounter. These invaders try to damage your body, but cannot because you command your army of guardians to destroy and eliminate their number. Every invader you encounter is destroyed...as you cleanse your body of the invaders, your body feels relaxed and at peace. This feeling of relaxation is a sign of the invaders being driven out. You have the capacity to rally your guardians by your will...visualize this. Now whenever you wish to mobilize your army of guardians...close your eyes...breath deeply and visualize entering your body...once inside, you make invoke, strengthen, and increase your army of protectors.

REFLECTIVE TIME

Focus on the complete sense of peace and relaxation you are now experiencing. Remember, that you can return to this state whenever you wish. As you focus on your breathing...think of the atmosphere cleansing your body...as you breath in, your body is made stronger and your guardians are strengthened. Now, I will count to TEN...after each number feel your body and mind ONE return to a refreshed TWO relaxed THREE invigorated state FOUR. Remember, the healing FIVE that took place SIX as you invoked SEVEN your guardian cells. EIGHT, NINE, now open your eyes and feel a great sense of relaxation, and invigoration TEN.

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ABSTRACT

GUIDED IMAGERY AS A PSYCHONEUROIMMUNOLOGICAL INTERVENTION FOR HIV-POSITIVE INDIVIDUALS

Christopher Dale Keene

The College of William and Mary in Virginia, April 1996

Chairperson: Victoria Foster, Ed.D.

The purpose of this study was to analyze the efficacy of immune system guided imagery in enhancing secretory immunoglobulin A (S-IgA) in individuals who are Human Immunodeficiency Virus (HIV) infected. Twenty-four males from central Virginia diagnosed with Stage IV AIDS participated. All were volunteers and were radomly assigned to either the control or imagery experimental group. All participants completed a medical health questionnaire. The dependent variable was S-IgA level in pre/posttest saliva samples.

Both groups met for 90 minutes to complete the questionnaire and receive the intervention or control condition. The experimental group gave a pretest saliva sample which was immediately followed by a 25 minute audiotaped immune system guided imagery exercise. The control group gave a pretest saliva sample with no following treatment. A posttest saliva sample was collected from both groups immediately following the experimental group's intervention. A second posttest saliva sample was collected from all participants 14 days after the first

session to determine any lasting treatment effect on the experimental group.

The research design used in this study was the Pretest/Posttest Control Group Design. The statisical procedure employed was the analysis of covariance. The Newman-Keuls method of multiple comparisons was used for post hoc analysis. Two null hypotheses provided the basis for testing for significant difference (α=.05) among the experimental and control group on S-IgA measures. S-IgA level was assayed by radial immunodiffusion (RID)

Analysis of the test data revealed that there was a significant difference between the control and experimental group on the posttest sample collected immediately following the intervention. No significant difference was found on the second posttest samples collected 14 days following the intervention.

Findings suggest that immune system guided imagery is effective in enhancing S-IgA levels in males with compromised immunocompetence resulting from HIV infection. The duration of the treatment effect is unkown.