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**Temporal differences in coping, mood and stress with
chemotherapy**

Chernecky, Cynthia Cecilia, Ph.D.

Case Western Reserve University (Health Sciences), 1991

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TEMPORAL DIFFERENCES IN COPING, MOOD
AND STRESS WITH CHEMOTHERAPY

BY
CYNTHIA CECILIA CHERNECKY

Submitted in partial fulfillment of the requirements
for the Degree of Doctor of Philosophy

Dissertation Advisor: Beverly L. Roberts, Ph.D.

Frances Payne Bolton School of Nursing
CASE WESTERN RESERVE UNIVERSITY

May, 1991

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GRADUATE STUDIES

We hereby approve the thesis of

Cynthia Cecilia Chernecky
candidate for the Doctor of Philosophy
degree.*

Signed:

Beverly L. Roberts
(Chairman)

May L. Wyke

Hilma J. Phipps

Walter A. Berger

Date April 3, 1991

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TEMPORAL DIFFERENCES IN COPING, MOOD
AND STRESS WITH CHEMOTHERAPY

Abstract

by

CYNTHIA CECILIA CHERNECKY

The purpose of this study was to examine the relationships among mood, coping, perceived stress and side effects from chemotherapy on individuals newly diagnosed with lung cancer and the temporal experience of these over four consecutive courses of intravenous combination chemotherapy.

Fifty persons, 39 males and 11 females, mean age 62.6 years, with stages III or IV adenocarcinoma of the lung participated in the study.

This longitudinal study had five time points of data collection, pre-treatment and the next four intravenous combination chemotherapy treatments. This design resolved the limitations of others by controlling for disease staging and treatment effects.

Findings showed that perceived stress was moderately high only at the time of pre-treatment and very low during treatment times. Also, four coping strategies were used: seeking social support, planful problem solving, self-control and positive reappraisal. No relationships existed between coping strategies and side

effects from chemotherapy, coping and perceived stress, mood and side effects, and perceived stress and side effects. There were no differences in mood between chemotherapeutic protocols and no trends in mood or coping over time. Also, only seven out of twelve side effects from chemotherapy occurred: leukopenia, decreased activity, nausea, loss of appetite, fatigue, constipation and taste changes. These were not frequent and occurred mostly at treatment time three.

In summary, receiving chemotherapy within a supportive environment is moderately stressful, but only at the time prior to chemotherapy. Subjects used a variety of coping strategies: seeking social support, planful problem solving, self-control, and positive reappraisal.

DEDICATION

This entire endeavor could not have been possible without the time, support, and encouragement of my family and friends; my mother Olga, my late father Edward, my brother Richard, my friend and colleague Ruth, my fellow classmate Rosalie, my grandmother Anna Budnik, my Godmother Helen, and the Orthodox Christians of St. Theodosius Cathedral. To my committee chairperson Dr. Beverly Roberts and committee members Dr.'s May Wykle, Wilma Phipps, and Nathan Berger who shared with me their time and professional expertise. And above all else, I could not have risen to this challenge without my faith in God and His in me.

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Chapter I

Problem

In the United States in 1991, an estimated one million people will be diagnosed with cancer (Boring et al., 1991). Thirty percent of them will have cancer of the lung (Boring et al., 1991). This cancer is the leading cause of death from cancer among men and has recently surpassed breast cancer as the leading cause of death from cancer among women (Silverberg & Lubera, 1987). One reason for the high morbidity is that lung cancer is often far advanced at diagnosis, making it surgically unresectable and, consequently, incurable. The other treatment options include radiation therapy and chemotherapy. While not curative, they may offer some hope of prolonged survival.

Unfortunately, these therapies are very taxing both physically and emotionally. This is particularly true for chemotherapy that can last for many months. Side effects such as alopecia, nausea, vomiting and diarrhea often cause physical decline. The frequent chemotherapy treatments and side effects along with the prospect of facing certain death will affect an individual's quality of life. Certainly the experience of receiving chemotherapy can profoundly affect psychological well being. Thus, the purpose of this study was to assess the

relationships among mood, coping strategies, perceived stress, and perception of side effects of chemotherapy on individuals with newly diagnosed lung cancer and the temporal experience of these over four consecutive courses of intravenous combination chemotherapy. The theoretical background for this study was Lazarus' theory of psychological stress and coping (Lazarus, 1981) and King's theory of goal attainment (King, 1981), which is an extension of Lazarus' theory that included a nursing perspective. These theories directed the researcher in identifying concepts and hypotheses. The model of these concepts can be found in Figure 1.

Figure 1

Conceptual Model

Conceptual Model

Lazarus' (1981) and King's (1981) models were useful in providing direction for this study. Lazarus' theory helped in explaining chemotherapeutic side effects as stressors, cognitive appraisal as a form of transaction

and perception, and coping and perceived stress as processes of transaction.

His theory of psychologic stress and coping also helped explain the relationship between chemotherapeutic side effects and coping. In this model, stress lies in the individual's appraisal of the relationship between input, chemotherapy and its side effects, the perceived demands of chemotherapy and the person's ability to cope (Lazarus & Folkman, 1984b; Folkman & Lazarus, 1984; Lazarus, 1981). The proposed study was based on the assumptions that the diagnosis of cancer and its treatment with intravenous combination chemotherapy were stressful events and that most persons would perceive them as being stressful. Therefore, Lazarus' theory was appropriate because appraisal and perception were part of the processes of determining chemotherapy as a stressful event. Within this framework, stress was defined as a relationship between person and environment that was appraised by the person as necessary for his or her well being, but in which the person's coping ability was taxed or exceeded. For example, intravenous combination chemotherapy frequently is perceived as a stressor, although it is seen as a necessary treatment. However, stressors may overly tax the person who not only has to deal with the diagnosis of cancer but also with

chemotherapy and its side effects. These side effects influence how the person copes and initially may influence the chemotherapeutic side effects at the next course of treatment. For example, if a person does not cope well with vomiting at treatment one, then vomiting may be increased at the next treatment because of a psychogenic reaction from the previous inability to cope effectively.

Lazarus described two processes as critical mediators of the stressful person-environment relationship. These processes were cognitive appraisal and coping. Cognitive appraisal was a process whereby an individual evaluated a particular encounter with the environment as being relevant to his or her well-being. If relevant, then the question, "Why is it relevant?", was asked. Perception was a very important part of cognitive appraisal because an individual evaluated what was relevant only by that which he or she perceived. For example, a person with cancer may have evaluated intravenous combination chemotherapy as being relevant to his or her well-being because it may have the potential to increase the quantity and quality of life. Given that chemotherapy is perceived to be stressful and relevant to well-being, persons receiving it must use some coping strategy to manage the demands placed upon them by the

chemotherapy.

Another concept Lazarus' theory helped explain was that of coping that refers to the person's cognitive and behavioral efforts related to managing demands placed on him or her by the person-environment transaction (Lazarus & Folkman, 1984b). In this case, it is the specific effort of the individual to manage the demands of side effects. The choice of a coping strategy to manage these may be determined by how the person cognitively appraises the threat of the side effects from the chemotherapy and the effectiveness of strategies to manage them.

Both cognitive appraisal and coping are transactions and refer to the integration of person to environment. An appraisal of a threat, such as loss of life from cancer, is a function of a specific set of environmental conditions that a person evaluates from his or her particular psychologic perspective. Similarly, coping consists of particular thoughts and behaviors a person uses to manage demands of this person-environment transaction, such as the demands of side effects from combination chemotherapy.

Folkman, Lazarus, Dunkel-Schetter et al., 1986, found that the coping strategy used varied depending on what was at stake (appraisal) and what coping options were employed. For example, in high stake conditions

self-control, escape-avoidance, or seeking social support were the major coping strategies employed. Thus, one would expect to see these three coping strategies in persons receiving intravenous combination chemotherapy because the high stake is life itself. Furthermore, when encounters were appraised as changeable, confrontive coping, planful problem solving, accepting responsibility, or positive reappraisal were the coping strategies employed. When the encounters were appraised as having to be accepted, distancing or escape-avoidance were used as coping strategies. Therefore, the person receiving combination chemotherapy and its induced side effects must appraise the stakes and changeability of side effects. The person may believe that chemotherapy will change the disease process or he or she just accepts the fact that this will happen. Depending on the appraisal one may predict which coping strategy would be used.

Folkman and Lazarus (1986) also compared high and low levels of depressive symptoms with coping strategies. The results indicated that subjects with high levels of depression were more likely to use confrontive coping, self-control, accepting responsibility, seeking social support, and escape-avoidance as coping strategies. Because depression is one of the dimensions of mood, this

study assessed the relationship between coping strategies and mood.

King's theory (1981) expanded on the concept of transaction and tied it to perception. Within this model, perception does not take place by itself but is seen as relational to a situation in the environment. Persons develop perceptions that are determined by some past experience. For example, the past experience of treatment with chemotherapy would influence a person's perception when receiving chemotherapy.

Lazarus (1981) and King (1981) defined perception and transaction in the same way. Perception was a part of an appraisal process that was necessary for giving meaning to a situation. The transaction was the observable behavior as persons interacted with the environment. This person-environment transaction created demands that resulted in the individual using coping strategies. Chemotherapy is an environmental factor which made persons choose coping strategies that would allow them to cope with the side effects of this therapy. Treatment with chemotherapy was an added stressor (Taylor et al., 1985) because it resulted in many physiological side effects. These side effects accounted for 38% of all stressors (Revenson et al., 1983). The stressors included nausea, vomiting, diarrhea, constipation, taste

changes, alopecia, fatigue, loss of appetite, skin rash, decreased activity, stomatitis, and leukopenia. Many of these side effects had a dual component of perception and subjectivity that resulted in cognitive appraisal. The cognitive appraisal of many of these side effects depended on what the person valued and the perspective from which he/she processed the information.

Lazarus' and Kings' theories speak to the relevance of both objective and subjective data. Objective data enhances data analysis and is another aspect of cognitive appraisal. Perception is important in that it plays a vital role in objective physiologic responses such as heart rate (Pennebaker, 1981), blood pressure (Pennebaker, Gonder-Frederick et al., 1982), and blood glucose (Pennebaker, Cox et al., 1981). Thus, it is reasonable to include the perception of side effects from intravenous combination chemotherapy and perception of stress in this study. Other objective data that needed to be collected because of its confounding role included type of chemotherapeutic agents.

Some chemotherapeutic agents directly affect mood and other agents influence different psychologic sequelae (see Appendix A). Certain chemotherapeutic drugs are known to cause depression (Peterson & Popkin, 1980), a dimension of mood that may be affected by different

chemotherapeutic agents.

Two other concepts included in both Lazarus' and King's theories pertinent to this study were perception and time.

Perception is each person's representation of reality and is subjective and transactional. Thus, perception is a process of human interaction with the environment. It gives meaning to experience and influences mood and behavior. In this research study, the person's perception of side effects influenced coping and mood. Side effects were also important concepts to study because past experiences influence perception. Past experience with side effects from intravenous combination chemotherapy may influence the use of coping strategies during subsequent treatments. The coping strategies employed can affect mood that in turn influences behavior. Several studies have shown that past experiences influence perceptions in present situations (Bruegel, 1971; Johnson, 1972) and coping (Folkman & Lazarus, 1984). Therefore, the past experience of receiving chemotherapy may influence perception when receiving current chemotherapy.

In summary, perception was a major concept in this study because it was hypothesized to influence both mood and coping through perception of side effects.

Another concept included in both Lazarus' and King's theories was time as it related to person-environment transaction. In this study, time was analagous to a temporal experience of the person-environment transaction with chemotherapy. Two characteristics of time, subjectivity and measurability, were important to the study. Subjectivity means that time was based on an individual's perception of successive events, such as successive treatment times for chemotherapy. This also meant that time was relational with one event following another. For example, the first treatment of intravenous combination chemotherapy was followed by the second treatment. Such successsion provided individuals with consistency in their environment because they could recall past treatments and begin to predict future treatments. This succession of time could influence the coping strategies chosen by the person and could influence the person's mood because mood is subjective.

The fact that time was measured as elapsed time gave the present study an added dimension. The researcher compared variables from one treatment time to another treatment time. This aided in discovering relationships between variables that occurred over time which would provide knowledge that nurses could use to assess the individual undergoing chemotherapy. Thus, nurses could

plan nursing interventions that would be most beneficial in helping the individual maintain or restore mental health.

Background and Significance

This study focused on mood, coping strategies, stress, and perception of side effects from chemotherapy. There has been limited research on these regarding persons with cancer as well as no research regarding persons receiving intravenous combination chemotherapy for lung cancer. Past studies did not control for disease staging (Derogatis et al., 1983) nor treatment effects (Dodd, 1984), and as a consequence, the results were of limited value. This is because samples lacked homogeneity and research studies discounted the confounding effects of side effects. This study attempted to resolve these limitations by including only persons with disease stages III and IV, and by measuring treatment effects.

The study of mood is necessary to gain an understanding of the behavior of persons undergoing intravenous combination chemotherapy. This understanding of behavior will assist health professionals in planning quality care. Mood influences behavior through its effects on social perception (Levison, 1959), self perception (Levison, 1959), social attitudes (Alexander,

1959; Axelrod, 1963), desirability of events (Axelrod, 1963), utility of events (Miller, 1960), memory retrieval (Rholes, Riskind & Lane, 1987), and critical judgement (Jacobson, 1957). Therefore, the significance of studying mood would be important because it would give the professional nurse a knowledge base from research that would aid in designing interventions to either change the persons behavior or help maintain it.

If the experience of receiving multiple treatments of intravenous combination chemotherapy has an effect on mood, then nurses, who spend the most time with clients, would be better able to intervene at times when the person is most at risk for psychological distress. Often the nurse administers the chemotherapy, attends to the client's health needs and implements interventions that add to the individual's health status and health potential that is within nursing's domain of practice (Schlotfeldt, 1987).

The clinically oriented significance of this present study was that research regarding combination chemotherapy, mood, and coping would provide the health care provider with data about changes in mood over time and also provide direction for assessing mood and planning interventions that would most likely be needed. For example, if depression increased with each

chemotherapy treatment, then the quantity and quality of nursing interventions could be increased.

In summary, the significance of this study would be the extension of knowledge concerning mood and coping as they relate to persons receiving multiple courses of chemotherapy. Information regarding the changes in mood over repeated treatments with chemotherapy would provide information that would assist the health care provider to identify the points in chemotherapy when mood was most likely to be disruptive. Moreover, anticipating these changes would allow interventions prior to or at the time of negative moods and to attenuate these adverse affects. Also, this study would identify coping strategies that could be used successfully in managing negative mood during chemotherapy while controlling for the limitations of disease staging and treatment effects found in previous studies.

Research questions and hypotheses

The research questions investigated in this study were:

1. What are the differences in mood over time in persons receiving four consecutive intravenous combination chemotherapy treatments?

H1a: There is no difference in mood between temporal experiences with intravenous

combination chemotherapy.

2. What are the differences in coping strategies over time in persons receiving four consecutive intravenous combination chemotherapy treatments?

H2a: There is no difference in coping strategies between temporal experiences with intravenous combination chemotherapy.

3. What is the relationship between mood and coping strategies?

H3a: There is a positive relationship between depression and confrontation.

H3b: There is a positive relationship between depression and self-control.

H3c: There is a positive relationship between depression and escape-avoidance.

H3d: There is a positive relationship between depression and seeking social support.

H3e: There is a positive relationship between depression and accepting responsibility.

H3f: There is no relationship between depression and distancing.

H3g: There is no relationship between depression and planful problem solving.

H3h: There is no relationship between depression and positive reappraisal.

H3i: There is no relationship between the eight forms of coping (confrontive, distancing, self-control, seeking social support, accepting responsibility, escape-avoidance, planful problem solving, and positive reappraisal) and the other five subscales of mood (tension-anxiety, anger-hostility, vigor-activity, fatigue-inertia, and confusion-bewilderment).

4. What is the relationship between mood and side effects from intravenous combination chemotherapy?

H4a: There is no relationship between mood and the perceived frequency of side effects from intravenous combination chemotherapy.

5. What is the relationship between coping strategies and side effects from intravenous combination chemotherapy?

H5a: There is no relationship between coping strategies and the perceived frequency of side effects from chemotherapy.

6. What is the difference in mood between protocols of intravenous combination chemotherapy?

H6a: There is no difference between mood and different protocols of intravenous combination chemotherapy.

7. What is the relationship between coping

strategies and perceived stress?

H7a: There is no relationship between coping strategies and perceived stress.

8. What is the difference in perceived stress over time in persons receiving four consecutive intravenous combination chemotherapy treatments?

H8a: There is no difference in perceived stress between temporal experiences with intravenous combination chemotherapy.

9. What is the relationship between perceived stress and side effects from intravenous combination chemotherapy?

H9a: There is no relationship between perceived stress and the perceived frequency of side effects from intravenous combination chemotherapy.

Definition of terms

Coping is the constantly changing cognitive and behavioral efforts made by a person to manage specific external or internal demands, or both, that are appraised as exceeding or taxing resources (Lazarus & Folkman, 1984b). To measure coping strategies the Forms of Coping Tool, developed by Folkman & Lazarus (1986), was used. This tool has eight scales, one for each subscale: confrontive coping, distancing, self-control, seeking

social support, accepting responsibility, escape-avoidance, planful problem solving, and positive reappraisal (Folkman & Lazarus, 1986).

Intravenous combination chemotherapy is a combination of known or experimental anti-cancer drugs, prescribed by a licensed physician, that are given intravenously. The combination of drugs vary from one protocol to another and drug dosages vary according to subject's weight and physiologic health. Current chemotherapeutic protocols for the treatment of non-oat cell lung cancer include Cytoxan, Adriamycin, Vincristine, and Cisplatin, and for small cell oat cell lung cancer include Velban (Vinblastine), Mitomycin C, and Cisplatin, or Cisplatin and VP-16 (Etoposide).

Mood is a prolonged emotional state (Stuart & Sundeen, 1987, p. 437) of one week duration (McNair, Lorr, & Droppleman, 1971) which is a reaction to stress and influences one's whole personality and life functioning. Mood was measured using the Profile of Mood States (POMS) developed by McNair, Lorr, & Droppleman in 1971. This tool has six subscale scores, one for each bipolar factor: tension-anxiety, depression-dejection, anger-hostility, vigor-activity, fatigue-inertia, and confusion-bewilderment (McNair, Lorr, & Droppleman, 1971).

Perceived side effects of chemotherapy are physical signs and symptoms perceived by the client as being a result of receiving intravenous combination chemotherapy. These include decreased activity, nausea, vomiting, hair loss, skin rash, loss of appetite, fatigue, stomatitis, constipation, diarrhea, taste changes, and leukopenia. The scores for all side effects, except leukopenia, are self-reports of the number of times each side effect occurred in the last week.

Perceived stress is a process in which the person transforms information while interacting with his or her environment. Perceived stress was measured on a zero to ten linear scale.

Chapter 2

Literature Review

Literature focusing on mood, coping, and stress was abundant, but little focused on persons with cancer, much less on persons with lung cancer who had received chemotherapy.

Mood

Mood has been conceptualized in a variety of ways and has caused considerable confusion in the research area of human feelings. Much of this can be traced directly to conceptual confusion (Holtzman, 1972), where mood has often erroneously been equated with temperament, affect, anxiety, or depression. Mood has been approached as behavioral change (Nowlis, 1965; Cattell, 1973; Ryle, 1950), subjective experience (Heidegger, 1962; Spiegelberg, 1960), psychodynamic change (Jacobson, 1957; Abraham, 1924; Erikson, 1959), and cognitive-affective interactions (Beck, 1967; Izard, 1971). It has been labeled a paradigm (Nowlis, 1962), a concept (Fridhandler, 1986), a state (McNair, Lorr & Droppleman, 1971; Stuart & Sundeen, 1987) and a set of dispositions (Nowlis, 1953; McNair et al., 1971). Mood was first discussed by Aristotle in 384 B.C. in the Rhetoric (Aristotle, 1972, reprint of 1877 edition) where he explains that inducing a particular mood in the audience

will allow the dramatist the path by which he can elicit certain emotional and other responses in his listeners. From Aristotle to the mid-nineteenth century very little research was done on mood to explicate its theoretical meaning.

In 1956, Nowlis discussed mood from a behavioristic approach and emphasized mood as a predispositional factor that is a source of stimuli to an organism. He developed and refined the Mood Adjective Checklist (Nowlis, 1956) for subjects' self-report of how strongly they experienced various feelings. Using factor analysis to identify the dimensions of mood, eight unipolar factors were revealed that theoretically fit what the author defined as mood.

In 1971, McNair et al. reviewed the multiple theoretical definitions, clarified the theoretical definition of mood and developed an instrument to measure it. Their instrument, Profile of Mood States, was developed over six replications with samples ranging in size from 150 to 650. Following factor analyses and after determining the theoretical fit of the factors the authors emerged with six bipolar scales: tension-anxiety, depression-dejection, anger-hostility, vigor-activity, fatigue-inertia, and confusion-bewilderment. These bipolar factors fit the dimensions identified by Nowlis

(1956) and were theoretically expected. This instrument was designed to measure change and was sensitive to the effects of drugs and the environment on patients' feelings (McNair, Lorr, & Droppleman, 1971, p. 5).

In a more recent conceptualization, Stuart and Sundeen (1987) used a psychologic approach to define mood as a "prolonged emotional state that influences one's whole personality and life functioning" (Stuart & Sundeen, 1987, p. 437). They also stated that mood serves an adaptive role for the individual in relation to a person's social communication, psychological arousal, subjective awareness, and psychodynamic defense (Stuart & Sundeen, 1987, p. 437). Murray and Hueliskoetter (1987) concur with the above conceptualization by stating that mood is a sustained feeling state (p. 81).

All of the conceptualizations of mood are similar in that they speak to emotions as a part of it. They are dissimilar in the outcomes (i.e. source of stimuli for behavior, influences both personality and life functions) and in the development of measurement tools.

For purposes of this study, mood was defined as a prolonged emotional state that was a reaction to stress and that influenced an individual's behavior. This definition was chosen because it theoretically fit the definition of mood that was based on the concepts of

depression, anxiety, anger, hostility, and fatigue. Also, this definition had been used with persons who had cancer and received chemotherapy (Holland, Korzen, et al., 1986). Moreover, the development of the Profile of Mood States instrument was based on this definition with several dimensions: depression, anxiety, anger, and hostility (McNair, Lorr, & Droppleman, 1971).

In summary, the major difference between mood and other related concepts was in the area of temporality (Heidegger, 1962; Denzin, 1984). Moods last for one week, emotions come and go, temperaments last for months to years and affects involve no specification as to time but are primarily noted in facial behaviors (Tompkins, 1980).

Mood, Cancer and Chemotherapy

There were three factors known to affect mood: chemotherapeutic drugs, other medications, and cognitive ability required for perception. The factors that impaired perception included drugs such as corticosteroids, phenothiazines, and narcotics (Perry & Yarbrow, 1984), hypercalcemia (Holland & Jacobs, 1986), alterations in the nervous system (Temoshok & Fox, 1984), and chronic personality disorders (Folstein et al., 1984). Perception is linked to mood in that if one's cognitive ability is altered then, a person's ability to

perceive the situation around him is altered, and thus, creates an altered mood state. In addition, cancer chemotherapeutic drugs were examined for their effects on mood in order to fill a knowledge gap concerning their effects on persons with lung cancer. Also, it was important to exclude individuals with hypercalcemia, metastasis to the brain and/or spinal cord, or persons having a history of chronic depression, as this study did, because these can alter a person's perception. Moreover, other factors that may directly affect mood were past treatments for cancer and type and stage of lung cancer. Therefore, these factors were controlled in this study in an effort to correct the methodological problems that occurred in previous studies.

Nine chemotherapeutic drugs used in the treatment of cancer were known to produce psychologic sequelae (Perry & Yarbrow, 1984), and these were assessed for in this study. These sequelae included changes in mood (Peterson & Popkin, 1980; Kennedy, 1970; Lubitz, Freeman, & Okun, 1973; Weiss et al, 1974; and Relkin, 1969). Cisplatin was one common chemotherapeutic drug used in the treatment of cancer (Rozenzweig, Von Hoff, Slavic & Muggia, 1977) that was clinically observed to affect mood in some cases (Perry & Yarbrow, 1984).

Because hypercalcemia can affect mood by causing

mental confusion (Baird, McCorkle, Grant, 1991), persons with metastatic cancer and serum calcium levels greater than 12 mg./dl. were not included in this study. Also, hypercalcemia causes mental confusion that could effect an individual's ability to complete the questionnaires.

In summary, moods result in behaviors that can be influenced by chemotherapeutic drugs, hypercalcemia, chronic personality disorders, and metastasis to the nervous system.

Ten other medications not specific for treating cancer but used in conjunction with chemotherapeutic agents or for concurrent medical conditions (see Appendix B) have been documented to influence two dimensions of mood, anxiety and hostility. Two other medications often used in medical treatment, Diphenylhydantoin (Gottschalk, Covi, Uliana, & Bates, 1973a) and hydrochlorothiazide (Gottschalk, Gleser, D'Zmura, & Hanenson, 1964), have not been found to influence anxiety or hostility.

Dexamethasone, frequently prescribed for persons with cancer and believed to influence changes in behavior, did not affect responses on the POMS instrument in 49 subjects with major depressive disorders (Brown & Shuey, 1980). Brown and Shuey (1980) also found that persons with secondary depression, such as that associated with cancer, did not have pituitary-adrenal disinhibition (as

assessed by a dexamethasone suppression test) when compared to the more clinically depressed psychiatric patients. Neither group differed on their responses on the bipolar subscales of the POMS instrument. Therefore, subjects who received dexamethasone were included in this study because it was felt that dexamethasone would not affect their responses on the POMS instrument.

Another factor that could influence mood was cognitive impairment. Cognitive impairment adversely affects the cognitive appraisal of an event or situation and the selection and implementation of coping strategies. Certain chemotherapeutic drugs are known to produce psychologic sequelae that interfere with an individual's ability to cognitively appraise an event. The prevalence of cognitive impairment in persons with cancer ranges from 25% to 29% which is no more than that found in persons with other medical problems, which was 30% to 34% (Folstein et al., 1984). It has been noted that cognitive impairment increases as prognosis worsens (Folstein et al., 1984) and as age increases (Silberfarb, 1983). Even though this research study included persons with poorer prognoses as evidenced by stages III and IV cancer, a projected older aged population, and receiving chemotherapy, the cognitive impairment of subjects in this study was projected to be no greater than that of

patients with other medical conditions.

Side effects of chemotherapy were further issues related to mood. Treatment related symptoms accounted for 38% of all stressors reported by persons with cancer (Revenson, Wollman & Felton, 1983). Because side effects accounted for this proportion of all stressors, they demonstrated that side effects have a probable influence on mood. Thus, side effects were included in this study to determine whether they and mood were related.

Stress and Coping

The major stressors for persons with cancer were demonstrated to be the diagnosis and intravenous chemotherapy (Taylor et al., 1985). Both of these make demands on the person that results in the individual learning to cope in the hope of surviving. Coping includes regulating stressful emotions and altering person-environment relationships that are perceived as being stressors. Coping is necessary for survival and determines how successful the person will be in reducing the effects of stressors. This study added new knowledge concerning what coping strategies were used by individuals with lung cancer who received chemotherapy over time.

The coping strategy used depends on what is at stake. Folkman, Lazarus, Dunkel-Schetter et al. (1986)

discovered that in high stake conditions three major coping strategies were used: self-control, escape-avoidance, and seeking social support. Because intravenous combination chemotherapy is a high stake condition that is associated with extending life, the predominant coping strategies expected to be used would be self-control, escape-avoidance and seeking social support. However, no known investigations examined coping or appraisal of chemotherapy among persons with any type of cancer.

Other stressors to consider are the diagnosis of cancer and its type and stage. Although poorly understood, the type of cancer affects mood (Novotny, Hyland, Coyne, Travis, & Pruyser, 1984) and may be related to the symptoms of cancer that depend on its anatomical site, effects on body organs, and the treatments employed. Thus, an understanding of stress must be understood in relation to staging, as was done in this study.

Although it has never been specifically studied, lung cancer has the potential to affect mood (Novotny, et al., 1984). The reasons for this include: physiologically lung cancer causes a change in activity level because of decreased oxygen-carbon dioxide exchange (Baird et al., 1991) that may also affect a persons'

mood, and the treatment with intravenous combination chemotherapy causes drug specific side effects that can affect mood (Perry & Yarbrow, 1984).

A major criticism of many of the studies concerning persons with cancer has been that staging was not included nor controlled for in the study. Derogatis et al. (1983) made this point clear when they suggest that staging may have had a significant effect on statistical outcomes such as stress, survival time, and coping. Weisman & Worden (1977) pointed out that staging accounted for 40-60% of the variance of person's self reported stress. Goodwin, Samet, Key, Humble, Kutvirt, & Hunt (1986) pointed out that not only was staging significant statistically but it varied with age, with lung cancer being diagnosed at earlier stages in older persons. Therefore, staging (Mortimer, 1987) must be considered when studying psychologic distress such as mood.

The diagnosis of cancer as a stressor is well documented (Kellogg & Sullivan, 1978; Donovan & Pierce, 1976) and may, therefore, adversely affect mood. However, contrary to expectations, 27% of newly diagnosed patients had positive moods while 29% responded with negative moods such as shock, fear or disbelief (Frank-Stromborg, Wright, Segella, & Diekmann, 1984). This

finding can be explained by the fact that before the 1970's the majority of physicians withheld the diagnosis of cancer from their patients (Oken, 1967). When plans for treatment were made, the persons' hopefulness might return (Krumm, 1982). However, if a population was chosen that was one year post diagnosis, considered the average time period necessary to get accustomed to the stress of cancer (Fobair & Mages, 1981), then they surely would have had at least one chemotherapy treatment and the phenomenon known as the neutral point would not be in effect. This point includes the notion that data can only be valid on groups that start at the same point, in this case those who never had chemotherapy. Indeed, the neutral point must be considered in a study of the effects of chemotherapy, the focus of the present study.

Mood and Cancer

There has been little research on mood among persons with cancer. Only six published studies were found and only one dealt with mood involving subjects receiving chemotherapy (Dodd, 1984). The other five studies (Taylor et al., 1985, Shacham et al., 1983, Romsaas et al., 1986, Holland, Korzun et al., 1986, and Carey & Posavac, 1979) dealt with mood among terminally ill subjects.

To determine their self-care behaviors and mood,

Dodd (1984) randomized 48 persons with cancer into four groups. These groups received chemotherapy for a duration of at least two weeks. The first group received only drug information, the second group received information on side effect management, the third group received both drug information and information on side-effect management, and the fourth group served as controls. The results indicated that there were no significant differences in mood between the four groups. Dodd called the low negative mood measured by the Profile of Mood States (POMS) tool at preintervention the basement effect. In essence, the design did not allow the effect of change to be studied because there was not much variability. Also, there was no mention of the type or stage of cancer of the study's population, unlike this study. The only criterion for participation was that the subjects were expected to live at least nine weeks. In addition, the subjects were not expected to be hospitalized more than 50% of the time during the four to nine week period between preintervention and postintervention. However, 13% of the subjects ($n = 56$) were critically ill and hospitalized. Of these 56 patients, 4 died, 2 were in coma, and 1 was admitted to a nursing home. This selection of subjects suggests that the study's population consisted of acutely ill persons

with late stage disease as did the subjects in the other five research studies. The subjects in the present study all had adenocarcinoma of the lung and stages III or IV disease but were not acutely ill.

Although literature on mood in persons with cancer was sparse, consisting of only six published studies, there was abundant literature concerning dimensions of mood as delineated in the POMS instrument. Depression is one dimension. In general, studies in several countries described persons with cancer as depressed (LeShan, 1966; Bahnson, 1976; Baltrush, 1975; Nemeth & Mazei, 1975; Stierlin, Wirsching, Haas, Hoffman, Schmidt, Weber, & Wirsching, 1983; McHugh, 1985) and depression was related to altered lymphocyte function which occurred in cancer (Kronfol, Silva, & Greden, 1983; Ader, 1975). Therefore, this study of depression, as part of mood in persons with cancer, was warranted. It was also warranted in persons who were receiving intravenous combination chemotherapy because intravenous combination chemotherapy had been shown to have a greater negative impact on one's emotional being than did single dose treatment (Palmer, Walsh, McKinnae, & Greening, 1980).

The remaining dimensions of mood (anxiety, hostility, activity, fatigue, and confusion) were well documented factors that affected people with cancer who

were receiving chemotherapy. For example, in one study, 27% of persons with cancer demonstrated anxiety (Derogatis, Morrow, Fetting, Penman, Piasetsky, Schmale, Henrichs, & Carnicke, 1983). According to several researchers hostility was a factor associated with lung cancer (Gordon, Freidenbergs, Diller, Hibbard, Wolf, Levine, Lipkins, Ezrachi, & Lucido, 1980; Husted & Johnson, 1985). Decreased activity (Nou & Aberg, 1980; Meyerowitz, Sparks & Spears, 1979), fatigue (De Haes & van Knippenberg, 1985), and confusion (Silberfarb, 1983) were other factors documented in studies of persons with cancer.

In addition, the dimensions of mood were relevant to health care services and research and had been well documented. These factors include anxiety (Welch-McCafferty, 1985; Derogatis, Morrow et al., 1983), depression (Glass, Allen & Uhlenhuth, 1978; Johnstone, 1976; Achute & Vauhkonen, 1970), hostility (Husted & Johnson, 1985; Gordon et al., 1980), activity (Nou & Aberg, 1980; Meyerowitz et al., 1979), fatigue (De Haes & van Knippenberg, 1985; Linssen, Hanewald, Huisman & van Dam, 1982), and confusion (Silberfarb, 1983).

Summary

To date little is known about the relationship between mood, coping, stress, and side effects of persons

with adenocarcinoma of the lung receiving chemotherapy. This is because literature on mood associated with cancer was rare (Holland, Fasanella & Ohnuma, 1974; Mann & Hutchinson, 1967), and although treatment related side effects were addressed, there was never acknowledgement of any possible relationship to coping or stress.

This study resolved several methodological limitations found in previous studies. These included assessing for cognitive impairment and hypercalcemia, and controlling for disease staging and type of cancer.

The purpose of this study was to examine the relationships among mood, coping, stress, and side effects from chemotherapy and the temporal experience of these on persons newly diagnosed with lung cancer receiving four consecutive intravenous combination chemotherapy treatments.

Chapter 3

Method

This prospective study examined the relationships among coping, mood, perceived stress, and side effects from intravenous combination chemotherapy and the temporal experience of these on persons over five time periods.

Sample

The sample consisted of persons newly diagnosed with cancer of the lung who were undergoing multiple course intravenous combination chemotherapy for the first time. This type of cancer was chosen for three reasons. First, the incidence of lung cancer is high, 20% for males and 11% for females (Silverberg & Lubera, 1987), so the results of this study would provide insight into a significant health problem. Second, 47% of persons with lung cancer have depressive moods (Diagnostic and Statistical Manual of Mental Disorders, 1980) and 13% have a diagnosis of depression (Derogatis, Morrow, et al., 1983). Thus, these results would be applicable to a larger population as compared to cancers that are more rare. Lastly, most persons with lung cancer are treated with intravenous combination chemotherapy that may adversely affect mood, stress and coping making these subjects appropriate for this study.

Subjects included persons over 18 years old, who were able to read English, were alert and oriented and were receiving their first cancer chemotherapy treatment. They included only those with a histodiagnosis of lung cancer because including other histological types of cancers would have added other confounding variables to the study. For example, breast cancer would have added body image as a confounding variable. Because persons with cancer are at increased risk for a major depressive episode with psychotic features (Endicott, 1984) and have significantly higher psychological distress (Derogatis, Morrow, et al., 1983) that would interfere with completing research tools and obtaining reliable data, subjects in this study were included if they had no known history of chronic depression. None had brain or central nervous system (CNS) metastasis or diagnosed hypercalcemia because these would have interfered with cognitive abilities that were needed to understand the research tools as well as to complete them. To avoid the phenomenon of the neutral point, subjects were not included who had a history of past cancer chemotherapy treatments. This point refers to the requirement that all subjects must start at the same level of experience, such as chemotherapy. The neutral point will yield a homogeneous sample with regards to the experience of the

diagnosis of cancer and with multiple courses of chemotherapy (Cassileth, Lusk, & Tenaglia, 1982; De Haes & van Knippenberg, 1985). Therefore, to maintain homogeneity and control for the phenomenon of the neutral point (Helson & Bevan, 1976), individuals having past treatments of chemotherapy for cancer were not included in this study.

Because there were no prior estimates of effect size on populations of persons with cancer, the conservative effect size of .20 with an alpha of .05 and a power of .80 were used to compute the sample size for this study (Levy & Lemeshow, 1980). The formula for computation of sample size was; $N = 9 (1 - P_y) / E^2 (P_y) = 9 (1 - .80) / (.20)^2 (.80) = 56$, with P_y representing power, and E representing effect size. Using this information, power analysis revealed that a sample of 56 subjects was needed.

A convenience sample of 50 hospitalized subjects with a histodiagnosis of lung cancer was obtained. The sample consisted of 39 males, 11 females, with a mean age of 62.6 years, $SD = 4.60$.

In this longitudinal study, data was collected at five time points: up to 72 hours prior to the first intravenous combination chemotherapy treatment and within 72 hours before treatments number two, three, four, and

five.

The hospital environments, where data was collected by the researcher, consisted of one community and two city hospitals. All hospitals had oncology certified staff nurses, clinical nurse specialists in oncology, open visitation policies, and support groups and support services for patients and their families. All staff nurses chose to work on the oncology units and all appeared to work well together in the supportive environment which they took part in creating.

Variables and their measurements

Mood - was measured by the Profile of Mood States (POMS), see Appendix C. The POMS is a 65-item adjective rating scale designed to measure six bipolar factors of mood that fit conceptually with the dimensions of mood. It represents a refinement of 100 different adjective scales through repeated factor analysis (McNair et al., 1971). The outpatient profile sheet was used in this research study. The six bipolar factors include tension-anxiety, depression-dejection, anger-hostility, vigor-activity, fatigue-inertia, and confusion-bewilderment. The tool's authors recommend that subjects have at least an eighth grade education to comprehend the instrument. However, because educational grade completed may not reflect ability to read and comprehend, all subjects who

could read and understand English were eligible for this study.

Each subject rated the 65 adjectives using a 5-point scale from "not at all" (1) to "extremely" (5) indicating the degree to which the adjective described their mood during the last week. This time period was long enough to depict persistent mood reactions as well as short enough to assess acute treatment effects and is conceptually compatible with the definition of mood as being an emotional state that lasts for up to one week.

To obtain a score for each bipolar mood, the ratings for the adjectives defining the factor were summed. The range of the bipolar scale scores were: (a) tension-anxiety, 0 to 32, (b) depression-dejection, 0 to 60, (c) anger-hostility, 0 to 48, (d) vigor-activity, 0 to - 32, (e) fatigue-inertia, 0 to 28, and (f) confusion-bewilderment, 0 to 24.

Internal consistency reliability coefficients ranged from .84 for confusion-bewilderment to .95 for depression-dejection. Specifically, the Kuder-Richardson 20 values were .90 for tension-anxiety, .95 for depression-dejection, .93 for anger-hostility, .87 for vigor-activity, .93 for fatigue-inertia, and .84 for confusion-bewilderment (McNair, Lorr, & Droppleman, 1971, p. 10). Test-retest reliabilities were .70 for

tension-anxiety, .74 for depression-dejection, .71 for anger-hostility, .65 for vigor-activity, .66 for fatigue-inertia, and .68 for confusion-bewilderment (McNair, Lorr, & Droppleman, 1971, p. 10).

Construct validity of the POMS instrument began with six factor analytic replications of the POMS (McNair et al., 1971; Lorr, Daston & Smith, 1967). The items defining each mood scale found in factor analysis were consistent with theoretical expectations of six dimensions.

Excluding the tool's developers, construct validity was established as the POMS was subjected to factor analysis by two independent groups who found the same subscales as those in the POMS and who found the POMS to be a useful test for assessing mood of patients and for determining changes in mood (Jacobson et al., 1978; Stitt et al., 1977).

The POMS correlated with other measures of mood that included measurements of depression, anger, hostility, confusion, fatigue and anxiety (Jacobson, Weiss, Steinbrook, Brauzer, & Goldstein, 1978) and was sensitive to interventions designed to affect mood (McNair et al., 1971). The results of four research studies provided evidence for the predictive validity and construct validity of the POMS instrument. These studies included

persons in psychotherapy (Lorr, McNair & Weinstein, 1964; Haskell, Pugatch & McNair, 1969; Pugatch, Haskell & McNair, 1969), controlled outpatient drug trials (Lorr, McNair & Weinstein, 1964; McNair, Goldstein, Lorr, Cibelli, & Roth, 1965; McNair, Kahn, Droppleman, & Fisher, 1967, 1968; McNair, Fisher, Sussman, Droppleman, & Kahn, 1970), studies of response to emotion (Pillard & Fisher, 1970; Mirin, Schapiro, Meyer, Pillard, & Fisher, 1971; Nathan, Zare, Ferneau, & Lowenstein, 1970; Nathan, Titler, Lowenstein, Solomon, & Rossi, 1970), studies of concurrent validity, ability of the instrument to distinguish individuals who differ in their present state on some criterion, (Lorr, McNair, & Weinstein, 1964; Pugatch et al., 1969; Haskell et al., 1969), and association with the Hopkins Symptom Distress Scale (Parloff, Kelman & Frank, 1954).

The POMS instrument has been used with several populations of persons with cancer (Taylor et al., 1985; Shacham et al., 1983; Romsaas et al., 1986; Holland, Korzun et al., 1986; Dodd, 1984; Carey & Posavac, 1979) and therefore, was found appropriate for measuring mood in this population, which was the focus of this study.

Side effects - were measured by the Treatment Related Side Effects tool, see Appendix D, developed by the investigator. The purpose of this instrument was to

measure the perceived number of side effects related to intravenous combination chemotherapy. The tool was developed using the total design method developed by Dillman (1978). Specific attention was paid to wording. Specifically, simple words were used, vague words were avoided, items were short and specific, and bias as well as objectionable and hypothetical questions were avoided.

Subjects rated the frequency of each of eleven side effects on a consecutive numerical scale from zero (0) to ten (10). These ratings were summed for a score of the number of side effects experienced since their last visit to the doctor prior to beginning chemotherapy or since their last chemotherapy treatment. The scores ranged from 0 to 110, with higher scores indicating more side effects.

Coping - was measured by the Forms of Coping instrument (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986) that was reworded to reflect the content of cancer and chemotherapy in this sample. In the pre-treatment form of the instrument (see Appendix E), the verb tenses were changed to be in the present tense and the post-treatment form of the instrument (see Appendix F) was in the past tense, as originally designed by its authors. However, several questions were reworded in both the pre-treatment and post-treatment instruments to

make it clearer that the referent situation was chemotherapy.

The authors (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986) stated that the items in the Forms of Coping instrument were initially selected on the basis of a review of subjects' responses to a structured protocol developed from 750 observations and a review of literature. Further revisions were necessary to delete redundant and unclear items. The result was a 50 item tool whose format changed from yes-no to a four point Likert scale of 0 "Does not apply" to 3 "Used a great deal". To further refine items and to ensure stability of items in a factor over samples, three factor analyses were performed. Thirty-six items consistently loaded highly on the same factors, and twenty-two loaded on the same factors fairly consistently. Eight items were eliminated on the basis of marginal factor loading or lack of conceptual coherence. The results produced eight subscales with different ranges: confrontive coping (0 to 15), distancing (0 to 18), self-control (0 to 21), seeking social support (0 to 18), accepting responsibility (0 to 12), escape-avoidance (0 to 24), planful problem solving (0 to 18), and positive reappraisal (0 to 21). The ratings of items in each subscale were summed for a score on the subscale,

indicating eight scores. Higher scores indicated greater use of the particular coping strategy.

Perceived stress - was measured by a equadistantly numbered ten point scale from 0 "not stressed at all" to 10 "Extremely stressed" (see Appendix G). The subjects were asked to circle the number that reflected how they felt during the past week. No reliability or validity had been established for this tool. The scores from this tool aided the researcher in determining the degree to which the subjects believed they could change their situations over time and represented their cognitive appraisal of their situation.

Data Collection

Subjects were identified through communication with clinical nurse specialists, nurse practitioners, registered nurses, and physicians caring for persons with lung cancer. Once an individual had been identified as being eligible for the study, the researcher approached the subject to seek their participation and was then interviewed to assess cognitive ability. Each subject was asked his/her name, their present location, and the day of the week, as well as determining if each question was answered within thirty seconds. If all responses were judged as an indication that the subject was alert and oriented, then they were considered to be eligible.

Those who were eligible and willing to participate received verbal and written explanations, and written consent (Appendix H) was obtained. Data regarding histodiagnosis, staging, total white blood cell count, serum calcium level, current medications, educational level, sex, age, time since diagnosis, and whether or not they had undergone radiation therapy or surgery as a treatment for their cancer was collected from the medical record and placed on the Demographic Data Tool (Appendix I). Within 72 hours prior to receiving their first intravenous combination chemotherapy treatment, the subject was asked to complete the POMS instrument, the Treatment Related Side Effects tool, the pre-treatment version of the Forms of Coping instrument, and the Perceived Stress instrument. The researcher, using the subject's chart, completed gathering information on staging (Appendix J), total white blood cell count, serum calcium level, current medications, chemotherapy medications and dosages, within 72 hours before the second, third, fourth, and fifth chemotherapy treatments. At these same times, the subject filled out the POMS instrument, Treatment Related Side Effects tool, the post treatment version of the Forms of Coping instrument, and the Perceived Stress instrument. If a subject was unable to continue in the study, the data was considered

incomplete and not used for analysis. The time table for this research study can be found in Appendix K.

Data Analysis

Descriptive statistics, frequency, mean and standard deviation were computed for mood, coping, perceived stress and side effects of chemotherapy over five time periods.

The variables in the first two research questions were analyzed using the same statistical methods.

Question #1. What is the difference in mood over time in persons receiving four consecutive intravenous combination chemotherapy treatments?

Question #2. What is the difference in coping strategies over time in persons receiving four consecutive intravenous combination chemotherapy treatments?

For the first question the dependent variables were the six subscales of mood and the independent variables were Time 0 (within 72 hours before the first chemotherapy treatment treatment), Time 1 (after the first chemotherapy treatment and within 72 hours prior to the second chemotherapy treatment), Time 2 (72 hours prior to the third chemotherapy treatment), Time 3 (72 hours prior to the fourth chemotherapy treatment), and

Time 4 (72 hours prior to the fifth chemotherapy treatment). For the second question the dependent variables were the eight forms of coping and the independent variables were Time 0, Time 1, Time 2, Time 3, and Time 4.

To determine differences across time for mood (Question #1) and coping (Question #2), multivariate analysis of variance (MANOVA) for repeated measures was used. If Wilk's lambda was significant for differences between group means over time at $p < .05$ then the Scheffee test, the most conservative univariate post hoc analysis, was computed. This test determined where significant differences between moods or coping strategies occurred with $t \geq 4.38$ at $p < .05$. This was followed by a trend analysis to reveal whether the trend over time was linear, quadratic, cubic, or quartic. The F-test was used to determine the significances of the trends.

The sixth and eighth research questions were analyzed using the same statistical methods.

Question #6. What is the difference in mood between protocols of intravenous combination chemotherapy?

Question # 8. What is the difference in perceived stress between the different treatment times of chemotherapy?

In question six the dependent variable was mood and the independent variables were three different protocols for the treatment of lung cancer including high dose Cisplatin with VP-16, Cisplatin with Mitomycin-C and Vinblastine, and low dose Cisplatin with VP-16. For question eight the dependent variable was perceived stress and the independent variables were the three treatment times.

Multivariate analysis of variance (MANOVA) for repeated measures was used to determine differences across time, and Wilk's lambda was used to determine significance of the difference. If significant differences were detected, the Scheffee test was computed to determine where significant differences occurred. This was followed by a trend analysis to determine whether the trend over time was linear, quadratic, cubic, or quartic. The F test was used to determine significances of trends.

Research questions 3, 4, and 5 were answered using the same statistical methods.

Question #3. What is the relationship between mood and coping strategies?

Question #4. What is the relationship between mood and side effects from intravenous combination chemotherapy?

Question #5. What is the relationship between coping strategies and side effects from intravenous combination chemotherapy?

For question three the independent variables were the eight coping strategies and the dependent variable was mood. For question four there was one dependent variable, mood. Independent variables included total white blood cell (WBC) count, decreased activity, nausea, vomiting, hair loss, skin rash, loss of appetite, fatigue, sores in the mouth, constipation, diarrhea, and taste changes. For the fifth question there was one dependent variable, coping. Independent variables included total white blood cell (WBC) count, decreased activity, nausea, vomiting, hair loss, skin rash, loss of appetite, fatigue, sores in the mouth, constipation, diarrhea, and taste changes.

To determine relationships between mood and coping (Question # 3), mood and side effects (Question # 4), and coping and side effects from chemotherapy (Question #5) canonical correlations were computed. If significant canonical correlations were discovered, then correlations between the variables and canonical variates were examined. Pearson correlation coefficients were then computed to reveal more information about the

relationships between the variables in the set comprising the canonical correlation.

Research questions seven and nine were answered using a univariate statistical test.

Question # 7. What is the relationship between coping strategies and perceived stress?

Question # 9. What is the relationship between perceived stress and side effects from intravenous combination chemotherapy?

For the seventh question the dependent variables were the eight coping strategies and the independent variable was perceived stress. For the ninth question there was one dependent variable, perceived stress. Independent variables included total white blood cell (WBC) count, decreased activity, nausea, vomiting, hair loss, skin rash, loss of appetite, fatigue, sores in the mouth, constipation, diarrhea, and taste changes.

To determine the relationships between coping strategies and perceived stress and between perceived stress and side effects from chemotherapy Pearson correlation coefficients were computed.

Protection of Human Rights

Once an individual had been identified, the researcher explained the study to the subject and written

consent was obtained, see Appendix H. Subjects were encouraged to ask questions and were told that their identity would be kept confidential. They were told they did not have to participate in the study, if they did participate they could withdraw at any time, and that withdrawal would not alter their usual health care. There was one risk associated with this study. That was subject fatigue from filling out four questionnaires for a total of 15-20 minutes. This risk was minimized by allowing enough time for rest periods. The benefit of being involved in this study was knowing that nurses would learn more about caring for people who receive chemotherapy. Following informed consent, the subject was interviewed and the chart reviewed for information necessary to complete the Demographic Data Tool. Confidentiality was assured by separating consent forms from all other data, using code numbers on all data, and storing all the data in a locked file in the researchers office.

Chapter 4

Results

After a description of the sample, the results of this study were organized according to the research questions studied.

Sample

The sample for this study consisted of 54 hospitalized subjects with Stages III or IV adenocarcinoma of the lung. One subject withdrew from the study, one died, and two became medically unable and could not continue chemotherapy. This left a total sample of 50 subjects: 78% male ($n = 39$) and 22% female ($n = 11$). The mean age of subjects was 62.6 years, $SD = 4.60$. Seventy-six percent ($n = 38$) had graduated high school, 12% ($n = 6$) did not graduate from high school, and 12% ($n = 6$) had taken college courses. None were college graduates.

All subjects had a diagnosis of adenocarcinoma of the lung. Twenty percent ($n = 10$) had stage IIIA, 36% ($n = 18$) had stage IIIB, and 44% ($n = 22$) had stage IV at the time of diagnosis. No subjects had initial diagnoses of stages I or II.

The average number of days the person knew their diagnosis before beginning chemotherapy was 3.6 days, $SD = 2.06$, range of 1 to 14 days. All subjects had

chemotherapy as a treatment modality. None had surgery and 12% ($n = 6$) had adjuvant radiation therapy.

Three different intravenous combination chemotherapy protocols were implemented. The first protocol, received by 82% ($n = 41$) of subjects, included Cisplatin 110 mg./m² plus VP-16 at 220 mg./m². The second protocol, received by 10% ($n = 5$) of subjects, included Cisplatin 110 mg./m² plus Mitomycin-C at 6 mg./m² and Vinblastine at 4.5 mg./m². The third protocol, received by 8% ($n = 4$) of subjects, included Cisplatin 80 mg./m² plus VP-16 at 180 mg./m². All three protocols are equal in their chemotherapeutic effects and included the alkylating agent Cisplatin and either Vinblastine or VP-16 which are plant alkaloids. All subjects received the same chemotherapeutic agents and doses at each of their four treatment times. No other medications were being taken by 82% ($n = 41$) of subjects. Eighteen percent ($n = 9$) took medications for other problems. These medications included diuretics ($n = 2$), antihypertensives ($n = 4$), a cardiotonic glycoside ($n = 1$), an antiarrhythmic ($n = 1$), and an antihistaminic agent ($n = 1$).

Differences in Mood Over Time

Means, standard deviations, ranges, and Wilk's lambda ($n = 50$) for six bipolar subscales of mood are summarized in Table 1. A multivariate analysis of

Table 1
Means, Standard Deviations, Ranges, and Wilk's Lambda of Six Subscales of Mood Over
Five Time Periods

Mood (Range)	Pretreatment	Time				Lambda
		1	2	3	4	
Tension/ Anxiety (0-36)	8.58 ^a	13.88	10.10	3.26	8.10	0.05***
	0.93 ^b	2.97	2.36	1.05	2.82	
	0-36 ^c	10-29	7-20	1-6	3-18	
Depression/ Dejection (0-60)	4.04	13.96	7.94	3.00	2.56	0.02***
	1.34	2.01	1.67	1.21	0.99	
	1-6	9-19	3-11	1-6	1-5	
Anger/ Hostility (0-48)	3.88	12.90	8.66	2.46	3.66	0.04*** ⁵
	1.10	2.91	2.13	0.81	1.29	
	1-6	3-19	3-14	0-5	1-6	
Vigor/ Activity (0-32)	24.32	16.08	16.42	23.26	19.26	0.10***
	2.56	3.34	2.43	3.28	2.57	
	21-30	5-21	11-22	6-27	13-26	
Fatigue/ Inertia (0-28)	6.62	7.96	14.04	6.44	14.74	0.04***
	1.47	2.28	2.60	2.84	2.23	
	3-9	4-17	3-19	3-22	9-20	
Confusion/ Bewilderment (0-28)	2.70	7.82	3.27	2.02	3.34	0.09***
	1.00	2.27	1.13	0.96	1.42	
	1-5	5-15	2-6	0-4	1-7	

^a Mean, ^b Standard Deviation, ^c Range
* p < .05, ** p < .01, *** p < .001

variance (MANOVA) was used to determine the difference in mood over time. All six subscales of mood were significantly different over time.

Four of the subscales had their highest mean scores at treatment time one: tension-anxiety ($\bar{M} = 13.88$), depression-dejection ($\bar{M} = 13.96$), anger-hostility ($\bar{M} = 12.90$), and confusion-bewilderment ($\bar{M} = 7.82$). Vigor-activity had the highest mean score at pre-treatment ($\bar{M} = 24.32$), and fatigue-inertia had the highest mean score at treatment time four ($\bar{M} = 14.74$). Overall, the means of the totals of the six subscales of mood over five time periods (Table 2) was highest at treatment time one and decreased to treatment time four where the mean ($\bar{M} = 52.16$) was near equivalent to the pre-treatment mean ($\bar{M} = 50.20$).

Table 2
Means, Standard Deviations, and Ranges of Total Mood Combined Over Five Time Periods

	Time			
Pre-treatment	1	2	3	4
50.20 ^a	73.16	60.88	40.24	52.16
4.95 ^b	6.63	5.61	4.24	5.43
42-63 ^c	59-80	47-63	26-52	42-61

^aMean

^bStandard deviation

^cRange is 0 - 232.

The Scheffe test of post hoc comparisons was used to determine which subscale means differed significantly from each other over time. Except for the time between pre-treatment and treatment time four (Table 3) tension-anxiety was significantly different among all time periods.

Table 3
Post hoc Comparisons of the Subscale of Mood,
Tension-Anxiety, Over Five Time Periods

Treatment Time	3	4	Pre	2	1
3					
4	*				
Pre	*				
2	*	*	*		
1	*	*	*	*	

NOTE: Only significant comparisons are listed in the table, $t \geq 4.38$ are significant at $p < .05$.

These changes are shown graphically (see Figure 2) and reveal that tension-anxiety decreases between treatments one, two, and three and increases again at time four. A trend analysis revealed no significant trends for these points.

Figure 2
Means of the Subscale of Mood, Tension-Anxiety, Over Time

For depression-dejection, all pairs of treatment times were significantly different except between treatment three and four (Table 4).

Table 4
Post hoc Comparisons of the Subscale of Mood, Depression-Dejection, Over Five Time Periods

Treatment Time	4	3	Pre	2	1
4					
3					
Pre	*	*			
2	*	*	*		
1	*	*	*	*	

NOTE: Only significant comparisons are listed in the table, $t \geq 4.38$ are significant at $p < .05$.

These changes are shown graphically (Figure 3) as depression-dejection increased from pre-treatment to treatment one, and then decreased continuously through treatment four. The time of the first chemotherapy treatment was when depression was highest, but it decreased after the first treatment. A trend analysis revealed no significant trends for these points.

Figure 3
Means of the Subscale of Mood, Depression-Dejection, Over Time

For anger-hostility all pairs of treatment times were significantly different except between pre-treatment and treatment four (Table 5). These differences, shown graphically (Figure 4), occurred between pre-treatment and treatments one, two, and three. These are the same as those found for the subscale of mood depression-dejection. A trend analysis revealed no significant trends for these points.

Table 5
Post hoc Comparisons of the Subscale of Mood,
Anger-Hostility, Over Five Time Periods

Treatment Time	3	4	Pre	2	1
3					
4	*				
Pre	*				
2	*	*	*		
1	*	*	*	*	

NOTE: Only significant comparisons are listed in the table, $t \geq 4.38$ are significant at $p < .05$.

Figure 4
Means of the Subscale of Mood, Anger-Hostility, Over Time

For vigor-activity, all pairs of treatment times were significantly different except between treatment one and two and between pre-treatment and treatment three (Table 6). These changes, shown graphically (see Figure 5), represented the largest decrease in activity between

Table 6
Post hoc Comparisons of the Subscale of Mood,
Vigor-Activity, Over Five Time Periods

Treatment Time	1	2	4	3	Pre
1					
2					
4	*	*			
3	*	*	*		
Pre	*	*	*		

NOTE: Only significant comparisons are listed in the table, $t \geq 4.38$ are significant at $p < .05$.

pre-treatment and time one. Activity then leveled off and was maintained until treatment time three where it rose to the pre-treatment level and then fell at treatment time four. A trend analysis revealed no significant trends for these points.

Figure 5
Means of the Subscale of Mood, Vigor-Activity, Over Time

For fatigue-inertia all pairs of treatment times were significantly different except three: between pre-treatment and three, between pre-treatment and one, and between treatments two and four (Table 7). There were two differences in fatigue: between treatments one and two and between treatments three and four, as shown graphically (Figure 6).

Table 7
Post hoc Comparisons of the Subscale of Mood, Fatigue-Inertia, Over Five Time Periods

Treatment Time	3	Pre	1	2	4
3					
Pre					
1	*				
2	*	*	*		
4	*	*	*		

NOTE: Only significant comparisons are listed in the table, $t \geq 4.38$ are significant at $p < .05$.

Figure 6
Means of the Subscale of Mood, Fatigue-Inertia, Over Time

A trend analysis revealed no significant trends.

The differences in means for fatigue-inertia were opposite those of vigor-activity. This is represented graphically in figures 5 and 6 and revealed that when vigor was the greatest was when fatigue was the lowest.

For confusion-bewilderment all pairs of treatment times were significantly different except three: between pre-treatment and three, between pre-treatment and four, and between treatment two and four (Table 8). As

Table 8
Post hoc Comparisons of the Subscale of Mood,
Confusion-Bewilderment, Over Five Time Periods

Treatment Time	3	Pre	4	2	1
3					
Pre					
4	*				
2	*	*			
1	*	*	*	*	

NOTE: Only significant comparisons are listed in the table, $t \geq 4.38$ are significant at $p < .05$.

represented graphically in Figure 7, the differences of confusion-bewilderment were small between pre-treatment and treatment one with a steady decrease between treatment times one, two, and three. A trend analysis revealed no significant trends.

Figure 7
Means of the Subscale of Mood, Confusion-Bewilderment,
Over Time

In summary, the patterns for tension-anxiety, anger-hostility, depression-dejection and confusion-bewilderment were similar in that the highest mean scores were at treatment time one, and there was a steady decrease in scores between treatment times one, two, and three. Vigor-activity and fatigue-inertia were mirror images representing that as activity decreased then fatigue increased. For all subscales of mood except fatigue-inertia, the pre-treatment mean scores were near equal to the mean scores at treatment time four. There were no significant trends revealed for any time points due to small differences between time points.

Coping Over Time

Means, standard deviations, ranges ($n = 50$) for eight coping strategies are listed in Table 9. The means and ranges are highest during different times for three coping mechanisms: for seeking social support at

treatment time four ($\bar{M} = 11.56$, Range = 4 - 15), for planful problem solving at the time of pre-treatment ($\bar{M} = 11.30$, Range = 8 - 15), and for positive reappraisal at the time of pre-treatment ($\bar{M} = 19.14$, Range = 12 - 21).

A multivariate analysis of variance (MANOVA) was performed to answer the second research question about differences in coping over time. Wilk's lambda was used to determine if there was a significant difference between group means across time, and all eight subscales of coping had a significant Wilk's lambda, (Table 9) indicating there were significant differences between the eight forms of coping over the five time periods.

The Scheffe test of post hoc comparisons was used to determine where significant differences occurred for the forms of coping over time. For confrontive coping, all pairs of treatment times were significantly different, except the time between pre-treatment and treatment time two (Table 10). Graphic representation of these means over time (Figure 8) showed that confrontive coping had a flat pattern over time. A trend analysis revealed no significant trends.

Table 9: Means, Standard Deviations, Ranges, and Lambda of Coping Over Time					
Coping(Range)	Times: Pretreatment	1	2	3	4
Confrontation (0-18)	2.44 ^a 0.68 ^b 1-5 ^c	2.04 0.45 1-4	2.74 0.66 1-4	1.06 0.42 0-3	3.48 0.71 3-5
Distancing (0-18)	2.60 0.88 1-6	3.00 0.93 1-6	3.78 1.00 2-6	0.90 0.54 0-2	3.68 0.94 2-5
Self-Control (0-21)	8.30 0.51 7-9	1.08 0.34 0-2	0.06 0.24 0-1	0.02 0.14 0-1	0.24 1.17 0-8
Seeking Social Support (0-18)	4.72 1.34 2-8	9.54 1.50 6-14	7.76 1.72 3-12	8.44 1.30 6-12	11.56 2.12 4-15
Accepting Responsibility (0-12)	2.36 0.66 1-5	1.06 0.37 0-2	1.04 0.28 0-2	1.08 0.27 1-2	2.32 0.51 1-3
Escape-Avoidance (0-24)	3.00 0.29 2-4	2.12 0.66 1-4	1.88 0.59 1-4	1.06 0.47 0-2	3.04 0.40 2-4
Planful Problem Solving (0-18)	11.30 2.01 8-15	1.20 0.67 0-3	3.94 1.00 2-6	3.68 0.98 2-6	9.66 1.48 3-12
Positive Reappraisal (0-21)	19.14 1.57 12-21	9.00 1.40 6-12	7.92 1.48 4-12	7.90 1.02 4-10	16.02 1.58 12-20
^a Mean, ^b Standard deviation, ^c Range * p < .05, ** p < .01, *** p < .001					

Table 10
Post hoc Comparisons of Coping by Confrontation Over Five Time Periods

Treatment Time	3	1	Pre	2	4
3					
1	*				
Pre	*	*			
2	*	*			
4	*	*	*	*	

NOTE: Only significant comparisons are listed in the table, $t \geq 4.38$ are significant at $p < .05$.

Figure 8
Means of the Subscale of Coping, Confrontation, Over Time

Distancing as a form of coping showed significant differences between all but two treatment times: between pre-treatment and one and between treatment two and four (Table 11). Graphic representation (Figure 9) shows that distancing had little variation over time. A trend analysis revealed no significant trends.

Table 11
Post hoc Comparisons of Coping by Distancing Over Five Time Periods

Treatment Time	3	Pre	1	4	2
3					
Pre	*				
1	*				
4	*	*	*		
2	*	*	*		

Note: Only significant comparisons are listed in the table, $t \geq 4.38$ are significant at $p < .05$.

Figure 9
Means of the Subscale of Coping, Distancing, Over Time

Self-control was significantly different between all five time periods (Table 12). Graphic representation (Figure 10) shows that self-control had a significant drop from the time of pre-treatment to the first dose of chemotherapy. A trend analysis revealed no significant trends.

Table 12
Post hoc Comparisons of Coping by Self-Control Over Five Time Periods

Treatment Time	3	2	4	1	Pre
3					
2					
4					
1	*	*	*		
Pre	*	*	*	*	

NOTE: Only significant comparisons are listed in the table, $t \geq 4.38$ are significant at $p < .05$.

Figure 10
Means of the Subscale of Coping, Self-Control, Over Time

Seeking social support showed small differences at all time periods (Table 13). Graphic representation (Figure 11) shows a pattern with the greatest difference being between the times of pre-treatment and treatment four. A trend analysis revealed no significant trends.

Table 13
Post hoc Comparisons of Coping by Seeking Social Support
Over Five Time Periods

Treatment Time	Pre	2	3	1	4
Pre					
2	*				
3	*				
1	*	*	*		
4	*	*	*	*	

NOTE: Only significant comparisons are listed in the table, $t \geq 4.38$ are significant at $p < .05$.

Figure 11
Means of the Subscale of Coping, Seeking Social Support,
Over Time

The form of coping, accepting responsibility, had significant differences between all time periods (Table

14). The means and ranges (see Table 9) showed that this type of coping was not frequently used. The graphic representation (Figure 12) showed little variation over time. A trend analysis revealed no significant trends.

Table 14
Post hoc Comparisons of Coping by Accepting
Responsibility Over Five Time Periods

Treatment Time	2	1	3	4	Pre
2					
1					
3					
4	*	*	*		
Pre	*	*	*		

NOTE: Only significant comparisons are listed in the table, $t \geq 4.38$ are significant at $p < .05$.

Figure 12
Means of the Subscale of Coping, Accepting
Responsibility, Over Time

Escape-Avoidance showed significant differences at all times except two: between treatment one and two, and

between pre-treatment and treatment four (Table 15). Means and ranges for escape-avoidance (see Table 9) showed that this form of coping was used infrequently. Graphic representation (Figure 13) illustrated very little variation over time. A trend analysis revealed no significant trends.

Table 15
Post hoc Comparisons of Coping by Escape-Avoidance Over Five Time Periods

Treatment Time	3	2	1	Pre	4
3					
2	*				
1	*				
Pre	*	*	*		
4	*	*	*		

NOTE: Only significant comparisons are listed in the table, $t \geq 4.38$ are significant at $p < .05$.

Figure 13
Means of the Subscale of Coping, Escape-Avoidance, Over Time

Planful problem solving was significantly different at all treatment times except between treatments two and three (Table 16). Means and ranges (see Table 9) showed that planful problem solving was frequently used as a form of coping. Graphic representation (Figure 14) indicated a pattern where the greatest variation was between pre-treatment and treatment one. A trend analysis revealed no significant trends.

Table 16
Post hoc Comparisons of Coping by Planful Problem Solving Over Five Time Periods

Treatment Time	1	3	2	4	Pre
1					
3	*				
2	*				
4	*	*	*		
Pre	*	*	*	*	

NOTE: Only significant comparisons are listed in the table, $t \geq 4.38$ are significant at $p < .05$.

Figure 14
Means of the Subscale of Coping, Planful Problem Solving, Over Time

The last form of coping, positive reappraisal, showed significant differences at all times except between treatments two and three (Table 17). Means and ranges (see Table 9) showed that this form of coping was used frequently. Graphic representation (Figure 15) shows variations in means with the largest being between pre-treatment and treatment one. A trend analysis revealed no significant trends.

Table 17

Post hoc Comparisons of Coping by Positive Reappraisal
Over Five Time Periods

Treatment					
Time	3	2	1	4	Pre
3					
2					
1	*	*			
4	*	*	*		
Pre	*	*	*	*	

NOTE: Only significant comparisons are listed in the table, $t \geq 4.38$ are significant at $p < .05$.

Figure 15
Means of the Subscale of Coping, Positive Reappraisal,
Over Time

In conclusion, there were four forms of coping used most often: seeking social support, planful problem solving, self-control, and positive reappraisal. Four coping mechanisms revealed no significant change over time: accepting responsibility, escape-avoidance, confrontation, and distancing. Trend analyses revealed no significant trends over time for any of the eight coping strategies.

Stress Over Time

A MANOVA revealed that stress was significant over time (Wilk's lambda of 0.03, $p < .001$). The Scheffe test,

a conservative univariate post hoc analysis, was used to determine where the significant differences occurred. The results revealed that no means from pre-treatment through treatment four were significantly different. Furthermore, a trend analysis revealed no significant trends.

Means, standard deviations, and ranges ($n = 50$) for perceived stress scores (range = 0 to 10) for five treatment periods are listed in Table 18. Perceived stress scores were highest at pre-treatment ($M = 6.10$) and decreased until treatment time three with a slight increase at treatment four ($M = 0.56$). The mean scores and range of scores decreased after treatment time two. The mean scores decreased from 2.32 at time one to 0.44 at time two as did the range of scores which decreased from 1 - 5 at time one to 0 - 2 at time two.

Table 18
Mean, Standard Deviation, and Range of Perceived Stress for Five Time Periods

Time Periods	Mean	<u>SD</u>	Range (0, 10)
Pre-treatment	6.10	1.63	1 - 8
Treatment # 1	2.32	0.91	1 - 5
Treatment # 2	0.44	0.81	0 - 2
Treatment # 3	0.30	0.54	0 - 2
Treatment # 4	0.56	0.70	0 - 2

Relationship Between Mood and Coping

At the time of pre-treatment, no canonical correlations were significant ($r = .63$, $p = .78$) between the dimensions of mood and eight forms of coping (Appendix L). Therefore, there was no need to assess univariately the pattern of the variables as there was no relationship between mood and coping at this time.

At the time of treatment one, only one canonical variate (Table 19) shared a significant percent of the variance (Eigen value = .65, $p < .001$) while another one approached significance (Eigen value = .61, $p < .19$).

Table 19
Canonical Correlations Between Mood and Coping at the Time of Treatment One

Number	Eigen value	Canonical correlation	Chi-Square	df	p value
1	.65	.81	69.12	35	.00
2	.61	.78	29.91	24	.19
3	.38	.62	9.89	15	.83
4	.11	.34	4.93	8	.77
5	.08	.24	1.42	3	.70

The correlations of mood and coping to the significant canonical variate are summarized in Table 20. Correlations of mood ranged from $< .001$ for vigor-activity to .63 for confusion-bewilderment. Correlations for coping ranged from .30 for self-control to .86 for positive reappraisal.

Table 20
Correlations of Mood and Coping on the First
Canonical Variate at Treatment Time One

MOOD	Correlation	COPING	Correlation
Tension-anxiety	.56	Confrontive	.34
Depression-dejection	.47	Distancing	.83
Anger-hostility	-.18	Self-control	.30
Vigor-activity	.00	Seeking social	
Fatigue-inertia	.45	support	.74
Confusion-		Accepting	
bewilderment	.63	responsibility	.49
		Escape-avoidance	.60
		Planful problem	
		solving	.65
		Positive	
		reappraisal	.86

Treatment time two revealed that the first set of canonical variates accounted for 68% of the total variance. Since this was not significant with an $r = .68$ and $p = .92$, (Appendix M) no univariate correlations were explored.

Treatment time three revealed that the first set of canonical variates accounted for 67% of the total variance (Appendix N). Since this was not significant, no univariate correlations were explored.

At treatment time four, the first canonical variate accounted for 65% of the total variance (Appendix O). Since this was not significant, no univariate correlations were explored.

Side Effects from Chemotherapy

Means, standard deviations, and ranges ($n = 50$) for eleven side effects associated with intravenous combination chemotherapy are listed in Table 21. The mean scores of decreased activity, nausea, loss of appetite, fatigue, constipation and taste changes increased from pre-treatment to treatment time three and then decreased at treatment time four. It was at treatment time three that most of the side effects occurred (Table 22).

Between the times of pre-treatment and treatment time three activity level decreased by 50%, nausea and loss of appetite increased 50%, fatigue increased by 75%, constipation increased by 33%, and taste changes increased by 40%. The remaining five side effects of vomiting, hair loss, skin rash, mouth sores, and diarrhea occurred rarely or not at all (Table 21).

The total WBC count decreased from pre-treatment to chemotherapy treatment three and then rose at chemotherapy treatment time four to near the pre-treatment mean score. Analysis of frequencies ($n = 50$) for total white blood cell (WBC) count over five time periods are shown in Table 23.

Table 21: Means, Standard Deviations, Ranges of Side Effects For Five Time Periods

Side Effect (Range)	Time: Pretreatment	1	2	3	4
Decreased activity (1-10)	0.02 ^a 0.14 ^b 0-1 ^c	3.32 1.13 0-6	4.32 1.13 2-6	5.08 1.24 2-7	1.82 1.41 0-5
Nausea (1-10)	0.00 0.00 0.00	4.36 0.96 2-6	5.52 1.27 2-8	5.86 1.41 2-8	3.28 1.21 1-6
Vomiting (1-10)	0.00 0.00 0.00	0.94 0.98 0-3	0.46 0.71 0-2	0.84 1.00 0-4	0.14 0.35 0-1
Hair Loss (1-10)	0.00 0.00 0.00	0.02 0.14 0-1	0.02 0.14 0-1	0.06 0.24 0-1	0.08 0.27 0-1
Skin rash (1-10)	0.00 0.00 0.00	0.02 0.14 0-1	0.02 0.14 0-1	0.02 0.14 0-1	0.00 0.00 0.00
Loss of appetite (1-10)	0.16 0.37 0-1	3.36 0.72 2-5	4.42 0.79 3-6	4.64 1.56 0-8	2.94 1.75 0-7
Fatigue (1-10)	0.10 0.14 0-1	4.22 1.13 2-6	6.12 1.13 0-8	7.58 1.24 3-9	6.08 1.41 0-8
Mouth sores (1-10)	0.00 0.00 0.00	0.22 0.62 0-3	0.14 0.45 0-3	0.16 0.51 0-2	0.04 0.20 0-1
Constipation (1-10)	0.24 0.43 0-1	2.42 1.05 0-6	2.56 1.39 0-6	3.58 1.70 1-8	0.90 0.84 0-3
Diarrhea (1-10)	0.00 0.00 0.00	0.18 0.44 0-2	0.04 0.20 0-1	0.30 0.81 0-3	0.06 0.24 0-1
Taste changes (1-10)	0.32 0.51 0-2	3.00 1.03 0-5	3.08 1.51 0-5	4.08 1.46 1-7	1.30 1.33 0-5

a Mean, b Standard deviation, c Range

Table 22
Means, Standard Deviations, and Ranges of the
Combined Eleven Side Effects From Chemotherapy Over
Five Time Periods

		Time			
	Pre-treatment	1	2	3	4
Mean	0.84	22.14	26.56	32.22	16.62
Standard deviation	1.02	2.63	1.96	2.19	2.18
Range	0-3	14-27	22-32	30-38	12-22

Note: Possible range is from 0 - 110.

Table 23
Mean, Standard Deviation, and Range of the Total
White Blood Cell Count Over Five Time Periods

		Time			
	Pre-Treatment	1	2	3	4
Mean	9.35	6.95	5.57	5.35	8.06
Standard deviation	1.51	1.61	2.09	1.57	0.85
Range	9-13	3-14	3-8	4-7	5-10

Note: Possible range is from 0 - 100.

Mood and Side Effects

Research question number four asked, What is the relationship between mood and the frequency of side effects from intravenous combination chemotherapy?

Pearson correlation coefficients were significant only between the mood subscales of confusion-bewilderment and fatigue-inertia and the total white blood cell (WBC) count. At treatment time one confusion-bewilderment was

significantly correlated with total WBC count ($\underline{r} = .34$, $p < .01$) and at treatment time four fatigue-inertia was correlated with total WBC count ($\underline{r} = .36$, $p < .01$). These two correlations lack theoretical rationale and probably occurred by chance alone.

At the time of pre-treatment, a non-significant canonical correlation of .56 with an Eigen value of .32 indicated that there was no relationship between moods and side effects at the time of pre-treatment.

At treatment time one, a canonical correlation of .78 with an Eigen value of .60, $p = .03$ indicated that the sets were not independent. The correlations of mood and side effects on the significant canonical variate are presented in Table 24. Correlations between the canonical variate and mood ranged from .04 for tension-anxiety to .73 for depression-dejection. Correlations for side effects ranged from $-.02$ for nausea to .69 for decreased activity.

Pearson correlations revealed that at treatment time one depression-dejection correlated with nausea ($\underline{r} = .30$, $p < .05$), anger-hostility correlated negatively with skin rash ($\underline{r} = -.49$, $p < .01$) and taste changes ($\underline{r} = -.40$, $p < .01$), vigor-activity correlated negatively with hair loss ($\underline{r} = -.31$, $p < .05$) and fatigue ($\underline{r} = -.28$, $p < .05$), fatigue-inertia correlated with nausea ($\underline{r} = .32$, $p < .05$)

Table 24
Correlations of Mood and Side Effects on the
First Canonical Variate at Treatment Time One

Mood	Correlation	Side Effect	Correlation
Tension-anxiety	.04	Decreased	.69
Depression-		activity	
dejection	.73	Nausea	-.02
Anger-hostility	-.60	Vomiting	-.23
Vigor-activity	.06	Hair loss	-.24
Fatigue-inertia	.54	Skin rash	-.04
Confusion-		Loss of	
bewilderment	.12	appetite	.06
		Fatigue	.40
		Mouth sores	-.37
		Constipation	-.08
		Diarrhea	.25
		Taste changes	.14

and hair loss ($r = .38$, $p < .01$), and confusion-bewilderment correlated negatively with decreased activity ($r = -.33$, $p < .05$) and taste changes ($r = -.30$, $p < .05$).

At treatment time two, a canonical correlation of .83 with an Eigen value of .68 was not significant ($p < .15$) between the dimensions of mood and side effects so univariate correlations were not explored.

At treatment time three, a canonical correlation of .86 with an Eigen value of .74 was not significant ($p = .49$) between the dimensions of mood and side effects so univariate correlations were not explored.

At treatment time four, a canonical correlation of .88 with an Eigen value of .77 was not significant ($p =$

.38) between the dimensions of mood and side effects so univariate correlations were not explored. In conclusion, no pattern of significant canonical correlations or Pearson correlations were found.

Coping and Side Effects

Research question number five asked, What is the relationship between coping strategies and side effects from intravenous combination chemotherapy?

At all five time periods none of the canonical correlations were significant so no univariate Pearson correlations were explored. At pre-treatment the canonical correlation was .49 ($p < .80$). At treatment time one the canonical correlation was .69 ($p = .20$). At treatment time two the canonical correlation was .85 ($p = .11$). At treatment time three the canonical correlation was .93 ($p = .28$). At treatment time four the canonical correlations was .88 ($p = .24$).

In conclusion, canonical correlations and univariate Pearson correlations for all five time periods were not significant, and there was no relationship between coping and side effects from chemotherapy at pre-treatment and subsequent chemotherapy.

Chemotherapy Protocols and Mood

Question number six asked, What is the difference between three intravenous combination chemotherapy

protocols and the six subscales of mood over time?. A multivariate analysis of variance (MANOVA) for repeated measures was used to answer this question. The three protocols were (1) Cisplatin 110 mg./m² plus VP-16 at 180 mg./m², (2) Cisplatin 110 mg./m² plus Mitomycin-C at 6 mg./m² plus Vinblastine at 4.5 mg./m², and (3) Cisplatin 80 mg./m² plus VP-16 at 180 mg./m². All three protocols are equal in their chemotherapeutic effect on the cell cycle, have the same drug nadirs, and contain both an alkylating agent, Cisplatin, and a plant alkaloid agent, Vinblastine or VP-16. Wilk's lambda (Table 25) was used to determine if the difference between group means was large enough to assure that the corresponding population means were statistically different. None of the Wilk's lambdas were significant ranging from .92 for depression-dejection, $p = .87$, to .72 for tension-anxiety, $p = .07$. Therefore, there was no significant difference between the three intravenous combination chemotherapy protocols used and the six subscales of mood over time.

Coping and Perceived Stress

Research question number seven asked, What is the relationship between coping strategies and perceived stress? To analyze these relationships univariate Pearson correlations were computed. Three out of a possible forty Pearson r 's were significant. These

Table 25

Means, Standard Deviations, and Lambdas for Six Subscales of Mood According to Three Different Intravenous Combination Chemotherapy Protocols

Mood	Chemotherapy Protocol			Lambda
	1	2	3	
Tension-Anxiety	8.78 ^a 2.03 ^b	8.40 2.00	8.80 2.06	0.72
Depression-Dejection	6.30 1.44	5.96 1.46	5.10 1.42	0.92
Anger-Hostility	6.31 1.65	5.48 1.58	6.35 1.72	0.83
Vigor-Activity	19.97 2.84	19.88 2.82	20.20 2.86	0.83
Fatigue-Inertia	9.96 2.28	9.56 2.27	9.65 2.31	0.85
Confusion-Bewilderment	3.92 1.35	4.04 1.38	3.45 1.31	0.79

Chemotherapy 1 ($\bar{n} = 41$) = Cisplatin 110 mg./m² + VP-16 at 180 mg./m²

Chemotherapy 2 ($\bar{n} = 5$) = Cisplatin 110 mg./m² + Mitomycin-C at 6 mg./m²

Chemotherapy 3 ($\bar{n} = 4$) = Cisplatin 80 mg./m² + VP-16 at 180 mg./m²

^a Mean ^b Standard deviation

* $p < .05$, ** $p < .01$, *** $p < .001$

occurred by chance alone and are not consistent with theoretical explanations. The three significant Pearson correlations were between planful problem solving and stress at treatment one ($r = .36, p < .05$), seeking social support and stress at treatment time four ($r = .35, p < .05$), and escape-avoidance at treatment time four ($r = .35, p < .05$).

Perceived Stress and Side Effects

To identify relationships between perceived stress and side effects from chemotherapy, univariate Pearson correlations were computed. Two Pearson correlations were significant: between perceived stress at the time of pre-treatment and the side effect of hair loss ($r = .36, p < .05$) and between perceived stress at the time of treatment four and the side effect of skin rash ($r = .45, p < .01$). Both of these are due to chance alone and are not consistent with theoretical explanations.

Chapter 5

Discussion

The purpose of this study was to examine the relationships among mood, coping, perceived stress and side effects from chemotherapy among individuals newly diagnosed with lung cancer and to assess the temporal experience of these over four consecutive courses of intravenous combination chemotherapy.

A total of 50 persons, 78% males ($n = 39$), 22% females ($n = 11$), mean age 62.6 years, with stages III or IV adenocarcinoma of the lung participated in the study. This resolved the limitation of previous studies where disease staging was not controlled (Derogatis et al., 1983). Also not controlled in prior studies were treatment side effects (Revenson, Wollman, & Felton, 1983). This present study controlled for treatment side effects by measuring eleven possible side effects at each of five time points: prior to chemotherapy and during the subsequent four treatments with intravenous combination chemotherapy.

In this present study, stress was highest prior to chemotherapy, fell slightly at the first treatment, continued to decline at the second treatment, and remained stable through the fourth treatment. Yet, even prior to chemotherapy, stress was found to be only

moderate, which supports the findings of others (Kellogg & Sullivan, 1978; Donovan & Pierce, 1976; Taylor et al., 1985) who noted that the diagnosis of cancer was a major stressor. However, the moderate to low stress experienced by the subjects in this study is not consistent with clinicians expectations. Moreover, Taylor et al. (1985) noted that receiving intravenous combination chemotherapy was more stressful than single agent chemotherapy. Although single agent chemotherapy was not compared in the present study, stress decreased with each subsequent experience with intravenous combination chemotherapy. This suggests that previous experience with chemotherapy may enable the person to anticipate events and symptoms with these treatments, and thus, reduce stress during subsequent treatments.

In this study, stress and side effects were not significantly related. In fact, stress was lowest at treatment time three when the incidence of side effects was highest. This finding does not support those of Revenson, Wollman, & Felton (1983) who found that a high incidence of side effects was related to increased stress. A possible explanation for this finding is that the side effects known to be the most disturbing, nausea, vomiting, diarrhea, and hair loss (Dodd, 1984) either had a low incidence of occurrence or were apparently well

controlled with medication in this study. Another side effect, low white blood cell counts, was said to decrease in response to increased stress (Kronfol, Silva, & Greden, 1983). In contrast, the white blood cell count was highest prior to chemotherapy, when stress was also the highest, and decreased over time as did stress in this present study. This finding is more likely related to the immunosuppressive effect of chemotherapy and it's nadir than to the level of stress experienced.

Coping was not significantly different with the temporal experience of chemotherapy. Of the eight coping strategies, four were virtually unused. These included accepting responsibility, escape-avoidance, confrontation, and distancing. Prior to chemotherapy, self-control was frequently used, while its use in subsequent treatments sharply declined and remained low during chemotherapy treatments. Also frequently used prior to chemotherapy treatment were planful problem solving and positive reappraisal. Not unlike self-control, both planful problem solving and positive reappraisal were less frequently used during the multiple chemotherapy treatments. However, by the last treatment, the use of both had risen to nearly their pre-treatment levels. In contrast, seeking social support was minimally used prior to chemotherapy, rose during the

first treatment, fell slightly at the next two treatments and rose again at the last treatment. Although no significant trends in coping were found, the coping strategies that were highest prior to chemotherapy centered around efforts to manage actively the experience of chemotherapy. On the other hand, during the treatments, when the individual had little to no control over side effects or treatment, the coping strategies switched from strategies that actively controlled the situation to external efforts that were more passive in nature. Lack of energy or side effects from chemotherapy influenced the utilization of coping strategies.

Although no significant relationships between coping and side effects were found in the present study, there is little to explain the increased use of planful problem solving, positive reappraisal, or seeking social support at the fourth treatment. Perhaps, the passage of time allowed for adjustment to chemotherapy and identification of strategies most useful in dealing with this experience. To date, coping strategies have not been investigated in this population. Thus, this study extends the knowledge about forms of coping.

In the present study, there was not a significant relationship between coping and stress, a finding inconsistent with the model of stress described by

Folkman, Lazarus, Dunkel-Schetter et al., (1986). In this model, three coping strategies would be expected to be used in high stress situations: self-control, escape-avoidance, and seeking social support. Since stress was moderate rather than high prior to chemotherapy and declined during chemotherapy, these coping strategies would not be expected to be used. The only coping strategy identified as being used during high stress situations that was also used during the moderate stress found in this study was self-control. Seeking social support was used in this study, but this occurred during times of low stress, during all four chemotherapy treatments. Although very minor differences existed in stress during all four chemotherapy treatments resulting in a basement effect in this study, knowledge was extended to identify coping strategies for lower levels of stress. Finally, it is difficult to say whether the coping strategies used were a result of the stress experience or whether the stress was reflective of adequate and effective use of coping strategies.

In this study, there were no significant trends in mood. However, significant temporal differences occurred for each of the six dimensions of mood: tension-anxiety, depression-dejection, anger-hostility, vigor-activity, fatigue-inertia, and confusion-bewilderment. Tension-

anxiety was significantly different between all chemotherapy times except between the time prior to treatment and the fourth treatment. Depression-dejection was significantly different between all times except between the third and fourth chemotherapy treatments. Anger-hostility was significantly different between all times except between the time prior to chemotherapy and the fourth chemotherapy treatment. For vigor-activity the differences between the times prior to chemotherapy and the third chemotherapy treatment and between the first and second chemotherapy treatment were the only ones not significant. Fatigue-inertia yielded three differences which were not significant: between the time prior to chemotherapy and the first treatment, between the time prior to chemotherapy and the third treatment, and between the second and fourth treatments. Confusion-bewilderment also showed three differences which were not significant: between the time prior to chemotherapy and the third and fourth treatments, and between the second and fourth treatments.

The pattern for tension-anxiety peaked at the time of the first chemotherapy treatment, decreased slightly at the second treatment, was lowest at the third treatment, and returned to the pre-treatment level at the fourth treatment. A similar pattern was found for three

other dimensions of mood: depression-dejection, anger-hostility, and confusion-bewilderment. One explanation for the peaks in four dimensions of mood at the time of the first treatment was that the introduction of chemotherapy and its associated potential side effects was a new experience for all subjects.

Vigor-activity peaked prior to chemotherapy and at the third treatment, while fatigue-inertia reached its lowest points prior to chemotherapy and at the third treatment. In fact, these dimensions used patterns that were near mirror images. That is, while vigor-activity decreased, fatigue-inertia increased. This lends validity that the Profile of Mood States tool can differentiate vigor-activity from fatigue-inertia. Generally, this mirror image could be explained by the cumulative effects of chemotherapy causing decreasing vigor and increasing fatigue. However, this explanation would not account for the paradoxical ratings of these moods at treatment three.

Taylor (1985) stated that the diagnosis of cancer adversely affects mood. While this makes logical sense, it was not supported by the findings in this study. The total mood at the time prior to chemotherapy, when the diagnosis was new, was actually lower than for the first treatment time, although not significantly different. In

the only other study examining the effects of chemotherapy on mood, Dodd (1984) found no significant differences in mood over time while subjects received chemotherapy, although she did not examine the six dimensions of mood. While this finding was supported by the findings of this present study, the dimensions of mood did show differences with chemotherapy.

No significant relationships were found between the dimensions of mood and side effects of chemotherapy. Although the canonical correlations did reveal some significant relationships between these variables at the first treatment, there is no theoretical rationale for their existence, and they likely occurred by chance alone. The apparent lack of relationships is again likely due to the small incidence of "disturbing" side effects of chemotherapy (Dodd, 1984) found in the present study.

Three chemotherapeutic protocols were used in this study. These included Cisplatin 110 mg./m² plus VP-16 at 180 mg./m², Cisplatin 110 mg./m² with Mitomycin-C at 6 mg./m² plus Vinblastine at 4.5 mg./m², and Cisplatin 80 mg./m² plus VP-16 at 180 mg./m². Perry and Yarbrow (1984) stated that Cisplatin can affect mood, but the findings of the present study cannot support this statement for two reasons. First, all three protocols included

Cisplatin making differentiation among protocols impossible. Second, there was an uneven distribution of subjects between the protocols yielding insufficient data for analysis of differences among protocols.

Gottschalk et al. (1964, 1973a) noted ten medications used for general medical conditions that may affect two dimensions of mood: tension-anxiety and anger-hostility. Eighty-two percent of the subjects in the present study took none of these ten medications, thus yielding insufficient data for determination of the effects of these on mood.

Nothing is known about the relationship between mood and coping. In this study, no significant multivariate relations between the six dimensions of mood and eight forms of coping were significant, either prior to or during chemotherapy. This suggests that either no relationships exist between the dimensions of mood and forms of coping or that they are so interrelated that correlations could not be determined.

Clinical Implications

According to Taylor et al. (1985), the subjects in the present study who were diagnosed with lung cancer and facing intravenous combination chemotherapy should have experienced high stress. Yet, this was not the case. Prior to treatment with chemotherapy, their stress was

moderate. Moreover, with the additional experience of receiving intravenous combination chemotherapy their stress actually decreased. Though unexpected, it suggests that either the experience is not as stressful as once thought or perhaps the environment and the person who gave the information were able to reduce the stress. The study does point out that the time to intervene in terms of addressing the stress at its highest point would be prior to beginning chemotherapy.

Because coping strategies during high stress are well documented (Folkman, Lazarus, Dunkel-Schetter, et al. 1986), it is reasonable to assume that this study provides some preliminary information regarding coping strategies used in lower stress situations. Self-control, planful problem solving, and positive reappraisal were used the most prior to chemotherapy treatment, when stress was moderate. However, during chemotherapy, when stress was lower, seeking social support was frequently used. Planful problem solving and positive reappraisal were used less, and self-control was not used at all. Based on these findings, nurses and other health care professionals should concentrate on enhancing those coping strategies used at given times: planful problem solving, self-control and positive reappraisal prior to chemotherapy and seeking social support during

chemotherapy. For example, prior to chemotherapy clients should be given as much control as possible over their treatment experience, adequate information to attempt problem solving, and acknowledgement of areas of growth which may have been mastered. Information on external supports should also be given as seeking social support is more prevalent during treatment when energy resources are lower. During treatment, medical support to control symptoms, nursing care to support coping strategies, and provisions by health care workers for enhancing emotional support will all be important.

Because fatigue generally increased during chemotherapy, partially as a result of the chemotherapeutic drugs and their nadirs, methods of energy conservation should be taught prior to receiving chemotherapy and reinforced during treatments. The presence of fatigue also reiterates the importance of assisting with an individual's preexisting coping strategies. This will eliminate the extra energy required to learn new coping strategies.

The fact that four of the six dimensions of mood (tension-anxiety, depression-dejection, anger-hostility, and confusion-bewilderment) peaked at the time of the first chemotherapy treatment suggests that the introduction of new experiences, chemotherapy with all of

its potential side effects compounded by a new diagnosis, might lead to disturbances in mood. This suggests that interventions, particularly information and emotional support, would be targeted at the time of the first treatment of chemotherapy.

Research Implications

Taylor et al. (1985) outlined that a diagnosis of cancer would yield high stress and that the experience of receiving intravenous combination chemotherapy would compound the stress, even more so than single agent chemotherapy. Based on the lower stress levels found in the present study and the fact that all subjects received combination chemotherapy, future research should be directed at verifying the level of stress in this population. This may be accomplished by using a group receiving single agent chemotherapy and comparing them to those receiving multiple chemotherapy agents.

Another interesting finding in this study was the increase use of the coping strategies, planful problem solving, positive reappraisal, and seeking social support at the fourth chemotherapy treatment. Because there is not a logical explanation for this phenomenon occurring when there were no changes in chemotherapy or treatment, additional research that includes data collection points beyond the four treatment times used in the present study

may provide some insight into this phenomenon. Perhaps significant trends exist beyond the four treatment points that were examined in this study.

Because Cisplatin affects mood (Perry and Yarbrow, 1984), additional research must be done to establish this finding. Because all subjects in this study received Cisplatin, it was impossible to determine whether Cisplatin had any affect on mood. Research using a control group receiving no chemotherapy and possibly another group receiving chemotherapy without Cisplatin would extend knowledge in this area.

The emergence of a peak in four of the six dimensions of mood (tension-anxiety, depression-dejection, anger-hostility, and confusion-bewilderment) at the first treatment suggests that interventions should be targeted at this point in time. Although many interventions such as physical and emotional support have been well documented, other specific interventions that would alter these four dimensions of mood have yet to be explored. For example, having the nurse stay with the person during the first treatment time may decrease tension-anxiety, allow time to ventilate one's feelings thereby decreasing depression and anger, and allow time to answer questions thereby decreasing the feelings of confusion-bewilderment. Future research should focus on

the evaluation of current interventions that alter the dimensions of mood tension-anxiety, depression-dejection, anger-hostility, and confusion-bewilderment, and the development of others must be examined with experimental studies.

Although this study found no significant relationship between the dimensions of mood and forms of coping, it is logically difficult to believe that they are unrelated. Nothing is currently known about this relationship, but there was some suggestion from this study, although not statistically significant, that a relationship may exist between tension-anxiety and positive reappraisal. Further research, with a larger sample to account for the multiple variables, would likely reveal the existence and nature of such a relationship.

Another recommendation would be to treat the environment as an independent variable when replicating this study as the environment in the present study was very supportive.

In addition, future studies could help determine what processes subjects used to help alleviate stress and to cope by using a design with open ended questions and examining the responses by using a content analysis.

The most tempting recommendation when looking at

future research is the suggestion to add more groups to the study design. For example, would the results be the same if the population received experimental chemotherapy rather than conventional chemotherapy? Would receiving chemotherapy as an outpatient change or strengthen any relationships among the same variables? As the list goes on, it is ever so apparent how little is known.

Limitations

Like all research, this study is not without limitations. One expected limitation of this study was that it would be difficult to collect the data given the number of questionnaires and seriously ill nature of the subjects. This was quite the contrary. By report, most subjects found participation in this study a welcome distraction during a boring and time consuming treatment. In fact, of the initial fifty four subjects entered in this study, only one withdrew for non-medically related reasons. However, since the researcher collected all the data and was also the clinical nurse specialist at one of the data collection sites, she may have intervened in such a way during chemotherapy to decrease stress and disturbances in mood, and thus, may have biased the results.

One limitation was that all subjects received intravenous combination chemotherapy. This study did not

examine those receiving single agent chemotherapy or those receiving no chemotherapy, which may have helped determine whether stress was actually higher among those receiving combination chemotherapy or whether the number of chemotherapeutic agents makes no difference in the experience of stress. However, this study did identify some preliminary knowledge and raises important questions for future research.

A second limitation was that few subjects received the chemotherapy protocols of Cisplatin 110 mg./m² + Mitomycin-C 6 mg./m² + Vinblastine 4.5 mg./m² or Cisplatin 80 mg./m² + VP-16 180 mg./m². Nearly all subjects received Cisplatin 110 mg./m² + VP-16 180 mg./m². In addition, there was no group that did not receive Cisplatin. The skewed distribution of the sample within groups made it difficult to determine if Cisplatin affected mood or whether or not it was dose related. Nonetheless, this study provided some beginning information on which to build.

A third limitation was that the nature of the data collection confounded the results because the subjects had time to discuss their disease with the researcher during the five times the tools were given to the subjects to complete. Further, asking subjects about their experiences may also have been a form of social

support that also decreased stress and disphoric mood. However, the researcher reports that there were minimal discussions at these times.

The most obvious limitation of this study was its generalizability. The sample included only those with stages III or IV lung cancer. Indeed, this represents a very specific population. However, this population is likely one of the largest populations of persons with cancer. Further, lung cancer is the most common form of cancer in both males and females; it is often stage III or IV at diagnosis', and chemotherapeutic options are limited. Thus, as a preliminary study exploring the effects of chemotherapy on mood, stress, and coping, much information was provided for those with advanced lung cancer. This is especially relevant given how little was known about the experience of receiving chemotherapy.

In summary, this study examined the effect of the experience of receiving intravenous combination chemotherapy on mood, coping, and perceived stress. Although this study identified relatively few significant relationships, it is as important to learn what relationships do not exist as it is to learn which ones do exist. Not unlike most research, more questions were raised than answered in the present study. Further investigation and replication are needed to extend

knowledge about the effects of chemotherapy on mood,
coping, and perceived stress.

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Appendix A

Chemotherapeutic Agents That Influence
Psychological Sequelae

<u>Agent</u>	<u>% Sequelae</u>	<u>Type Sequelae</u>	<u>Research</u>
Mithramycin	86%	Agitation Anxiety Irritability Lethargy	Kennedy, 1970.
Vinblastine (Velban)	80%	Anxiety Depression Mood Change	Peterson & Popkin, 1980.
Methotrexate	50%	Confusion Insomnia Irritability	Peterson & Popkin, 1980.
Mitotane	40%	Dizziness Lethargy Somnolence	Lubitz, Freeman & Okun, 1973.
Procarbazine	33%	Drowsiness Sensory change	Weiss, Walker & Wiernik, 1974.

Appendix A (continued)

<u>Agent</u>	<u>%Sequelae</u>	<u>Type Sequelae</u>	<u>Research</u>
L-Asparaginase	21-60%	Affect Emotions Depression	Peterson & Popkin, 1980.
Prednisone	20%	Mood Change	Gottschalk 1968c; Relkin, 1969; Gottschalk & Gleser, 1969.
Hexamethylamine	10-20%	Confusion	Legha, Slavik & Carter, 1976.
DTIC	5%	Confusion Lethargy	Paterson & McPherson, 1977.
Nitrogen mustard	unknown	Confusion	Hildebrand 1978.
Carmustine	unknown	Confusion Disorientation	Madajewicz et al., 1981.

Appendix A (continued)

<u>Agent</u>	<u>% Sequelae</u>	<u>Type Sequelae</u>	<u>Research</u>
5-Azacytidine	unknown	Confusion Lethargy	Levi & Wiernik, 1976.
ARA-C	unknown	Confusion	Silberfarb, 1983.
Isophos- phamide	unknown	Disorientation Somnolence	Silberfarb, 1983.

Appendix B

Other Medications That Influence Two Factors Of Mood:
Anxiety and Hostility

<u>Medication</u>	<u>Dose</u>	<u>Anxiety</u>	<u>Hostility</u>	<u>Research</u>
Chlordi- azepoxide	20mg	decrease	decrease	Gottschalk & Kaplan, 1972b.
Imipramine	100mg	increase	increase	Gottschalk et al., 1965b.
Lorazepam	4-5mg	decrease	no effect	Gottschalk et al., 1971b.
Meperidine	100mg	decrease	decrease	Elliott, 1974.
Perphen- azine	16mg	decrease	decrease	Gottschalk et al., 1960.
Phenobar- bital	100mg	decrease	no effect	Elliott et al., 1974.

Appendix B (continued)

<u>Medication</u>	<u>Dose</u>	<u>Anxiety</u>	<u>Hostility</u>	<u>Research</u>
Compazine	25mg	no effect	increase	Gottschalk, Gleser,
Phenergan	25mg	no effect	increase	Cleghorn, Stone, &
Thorazine	25mg	no effect	increase	Winget, 1970.
Propranolol	40mg	decrease	no effect	Gottschalk 1974c.

Appendix C

Outpatient form of the Profile of Mood States (POMS) instrument. Copyright by Educational and Industrial Testing Service (EdITS) of San Diego, California.

Appendix D

Treatment Related Side Effects Tool

Since your last chemotherapy treatment (or your last visit to the doctor if you're beginning chemotherapy) how many times have the side effects listed below occurred?

Number of times you have experienced;
(Circle your answers)

1. Decreased

Activity	0	1	2	3	4	5	6	7	8	9	10
----------	---	---	---	---	---	---	---	---	---	---	----

2. Nausea	0	1	2	3	4	5	6	7	8	9	10
-----------	---	---	---	---	---	---	---	---	---	---	----

3. Vomiting	0	1	2	3	4	5	6	7	8	9	10
-------------	---	---	---	---	---	---	---	---	---	---	----

4. Hair Loss	0	1	2	3	4	5	6	7	8	9	10
--------------	---	---	---	---	---	---	---	---	---	---	----

5. Skin Rash	0	1	2	3	4	5	6	7	8	9	10
--------------	---	---	---	---	---	---	---	---	---	---	----

6. Loss of

Appetite	0	1	2	3	4	5	6	7	8	9	10
----------	---	---	---	---	---	---	---	---	---	---	----

7. Fatigue	0	1	2	3	4	5	6	7	8	9	10
------------	---	---	---	---	---	---	---	---	---	---	----

8. Mouth Sores	0	1	2	3	4	5	6	7	8	9	10
----------------	---	---	---	---	---	---	---	---	---	---	----

9. Constipation	0	1	2	3	4	5	6	7	8	9	10
-----------------	---	---	---	---	---	---	---	---	---	---	----

10. Diarrhea	0	1	2	3	4	5	6	7	8	9	10
--------------	---	---	---	---	---	---	---	---	---	---	----

11. Taste

Changes	0	1	2	3	4	5	6	7	8	9	10
---------	---	---	---	---	---	---	---	---	---	---	----

Appendix E: Forms of Coping: Pre-treatment

Instructions: Place an "X" in a numbered box after each question that indicates how you feel about your upcoming chemotherapy treatment.

	Does not apply or not used	Used Sometimes	Used quite a bit	Used a great deal
1. I just concentrate on what I have to do next; the next step.				
2. I am doing something which I don't think will work, but at least I am doing something.				
3. I will try to get someone to change my mind about the chemotherapy treatment.				
4. I will talk to someone to find out more about my chemotherapy treatment.				
5. I will criticize or lecture myself.				
6. I will try not to burn my bridges, but leave things open somewhat.				
7. I hope a miracle will happen.				
8. I will go along with fate, sometimes I just have bad luck.				
9. I will go on as if nothing has happened.				
10. I will try to keep my feelings to myself.				

Appendix E (continued)

	Does not apply or not used	Used sometimes	Used quite a bit	Used a great deal
11. I will look for the silver lining, so to speak; try to look on the bright side of things.				
12. I will sleep more than usual.				
13. I will express my anger to the person(s) who will give me the chemotherapy.				
14. I will accept sympathy and understanding from my family or hospital personnel.				
15. I will be inspired to do something creative.				
16. I will try to forget the whole thing.				
17. I will get help from a nurse or physician concerning my chemotherapy.				
18. I will change or grow as a person in a good way.				
19. I need to appologize for something I might do during my chemotherapy treatment.				
20. I will make a plan of action and follow it.				
21. I will let my feelings out.				
22. I realize that the choice to receive the chemotherapy is my own.				

Appendix E (continued)

	Does not apply or not used	Used sometimes	Used quite a bit	Used a great deal
23. I will come out of the experience better than when I go in.				
24. I will talk to someone about my upcoming chemotherapy treatment.				
25. I will try not to act too hasty or follow my first hunch.				
26. I will take a big chance or do something very risky.				
27. I will find new faith.				
28. I will try to make myself feel better by eating, drinking, smoking, using drugs or medication, and so forth.				
29. I will rediscover what is important in life.				
30. I will change something so things will turn out all right.				
31. I will avoid being with people in general.				
32. Won't let receiving chemotherapy get to me; refuse to think about it too much.				
33. I will ask a relative or friend I respect for advice about chemotherapy.				

Appendix E (continued)

	Does not apply or not used	Used sometimes	Used quite a bit	Used a great deal
34. I will keep others from knowing how bad things might be.				
35. Make light of receiving chemotherapy; refuse to get too serious about it.				
36. I will talk to someone about how I am feeling.				
37. I will stand my ground and fight for what I want concerning the time my chemotherapy treatment is to be given.				
38. I will take my feelings out on other people.				
39. I will draw on my past experiences; I was in a similar position before.				
40. I know what has to be done, so I will double my efforts to make things work.				
41. I refuse to believe that I will be receiving chemotherapy.				
42. I will make a promise to myself that things will be different next time.				
43. I will come up with a couple of different solutions for the treatment of my disease.				

Appendix E (continued)

	Does not apply or not used	Used sometimes	Used quite a bit	Used a great deal
44. I will try to keep my feelings from interfering with other things too much.				
45. I will change something about myself.				
46. I wish that the situation would go away or somehow be over with.				
47. I have fantasies about how things might turn out.				
48. I pray.				
49. I go over in my mind what I will say or do.				
50. I think about how a person I admire would handle the situation and use that as a model.				

Appendix F: Forms of Coping: Post-treatment

Instructions: Place an "X" in a numbered box after each question that indicates how you felt during your most recent chemotherapy treatment.

	Does not apply or not used	Used sometimes	Used quite a bit	Used a great deal
1. I just concentrated on what I had to do next - the next step.				
2. I did something which I didn't think would work, but at least I was doing something.				
3. I tried to get someone to change my mind about the chemotherapy treatment.				
4. I talked to someone to find out more about my chemotherapy treatment.				
5. I criticized or lectured myself.				
6. I tried not to burn my bridges, but leave things open somewhat.				
7. I hoped a miracle would happen.				
8. I went along with fate, sometimes I just have bad luck.				
9. I went on as if nothing had happened.				
10. I tried to keep my feelings to myself.				

Appendix F (continued)

	Does not apply or not used	Used sometimes	Used quite a bit	Used a great deal
11. I looked for the silver lining, so to speak; tried to look on the bright side of things.				
12. I slept more than usual.				
13. I expressed anger to the person(s) who gave me the chemotherapy.				
14. I accepted sympathy and understanding from my family or hospital personnel.				
15. I was inspired to do something creative.				
16. I tried to forget the whole thing.				
17. I got help from a nurse or physician concerning my chemotherapy treatment.				
18. I changed or grew as a person in a good way.				
19. I apologized for something I did during my chemotherapy treatment.				
20. I made a plan of action and followed it.				
21. I let my feelings out.				
22. I realized that the choice to receive chemotherapy was my own.				

Appendix F (continued)

	Does not apply or not used	Used sometimes	Used quite a bit	Used a great deal
23. I came out of the experience better than when I went in.				
24. I talked to someone about my chemotherapy treatment.				
25. I tried not to act too hastily or follow my first hunch.				
26. I took a big chance or did something very risky.				
27. I found new faith.				
28. I tried to make myself feel better by eating, drinking, smoking, using drugs or medication, and so forth.				
29. I rediscovered what is important in life.				
30. I changed something so things would turn out all right.				
31. I avoided being with people in general.				
32. Didn't let receiving chemotherapy get to me; refused to think about it too much.				
33. I asked a relative or friend I respected for advice about chemotherapy.				

Appendix F (continued)

	Does not apply or not used	Used sometimes	Used quite a bit	Used a great deal
34. I kept others from knowing how bad things were.				
35. Made light of receiving chemotherapy; refused to get too serious about it.				
36. I talked to someone about how I was feeling.				
37. I stood my ground and fought for what I wanted concerning the time my chemotherapy treatment was given.				
38. I took my feelings out on other people.				
39. I drew on my past experiences; I was in a similar position before.				
40. I knew what had to be done, so I doubled my efforts to make things work.				
41. I refused to believe that I was receiving chemotherapy.				
42. I made a promise to myself that things would be different next time.				
43. I came up with a couple of different solutions for the treatment of my disease.				

Appendix F (continued)

	Does not apply or not used	Used sometimes	Used quite a bit	Used a great deal
44. I tried to keep my feelings from interfering with other things too much.				
45. I changed something about myself.				
46. I wished that the situation would go away or somehow be over with.				
47. Had fantasies about how things might turn out.				
48. I prayed.				
49. I went over in my mind what I would say or do.				
50. I thought about how a person I admire would handle the situation and used that as a model.				

Appendix H

Consent Form

I _____ consent to participate in a research study conducted by Cynthia Chernecky, a registered nurse and doctoral student at Case Western Reserve University. The purpose of the study is to learn more about the emotions of people who receive chemotherapy. I realize that there is a risk of me becoming tired as I will be required to fill out four questionnaires that will take a total of 15-20 minutes to complete. I also realize that the benefit involved in being a part of this study is that nurses will learn more about caring for people who receive chemotherapy. I also understand that I may withdraw from this study at any time and that my decision to participate or not participate will not alter my usual health care. I further consent to having my past, current, and ongoing medical records reviewed periodically. In the use of information generated from this study, my identity will remain anonymous.

I will complete four questionnaires, which will require a total of 15 to 20 minutes to complete, within 72 hours before receiving my first chemotherapy treatment and also within 72 hours of each one of my next four chemotherapy treatments beginning with treatment number two.

If there are any questions, I can call the investigator Cynthia Chernecky at (216) 368-2540.

Signature _____	Date _____
Witness _____	Date _____

Appendix I
Demographic Data Sheet

The researcher will complete this form at the initial treatment time and update it at each subsequent treatment time.

1. Histodiagnosis of lung cancer : (Circle answer)
 Squamous cell carcinoma
 Adenocarcinoma
 Undifferentiated small cell (oat cell)
2. Stage of lung cancer at diagnosis: (Circle answer)
 Stage 0 Stage IIIa
 Stage I Stage IIIb
 Stage II Stage IV
3. Sex: (Circle answer) = Male or Female
4. Age in years (Write in answer) = _____
5. Education (Circle answer):
 Did not complete high school
 Graduated high school
 Had college courses but did not graduate college
 Graduated from college
 Advanced degree
6. Time since diagnosis = _____ weeks + _____ days.
7. Past treatment history for cancer
 (Circle appropriate answer after asking the
 subject the following questions)
 Did you have radiation therapy as a treatment for
 cancer? Yes _____ No _____
 If YES: Do you think the radiation treatment(s)
 helped? YES _____ No _____
 Did you have surgery as a treatment for cancer?
 Yes _____ No _____
 If YES: Do you think the surgery helped?
 Yes _____ No _____
8. Total White Blood Cell Count per millimeter cubed
 Pre-treatment = _____
 Prior to treatment #2 = _____
 Prior to treatment #3 = _____
 Prior to treatment #4 = _____
 Prior to treatment #5 = _____

Serum Calcium	
> 12 mg/dl.	
YES	NO

_____	_____
_____	_____
_____	_____
_____	_____

Appendix I (continued)

9. Circle the current chemotherapy, and write in the dosage and frequency for each drug circled.

<u>Current Chemo</u>	<u>Dosage</u>	<u>Frequency</u>
----------------------	---------------	------------------

Adriamycin

ARA-C

Cisplatin

Cytosan

DTIC

Isophosphamide

L-asparaginase

Methotrexate

Mithramycin

Mitomycin-C

Mitotane

Nitrogen Mustard

Prednisone

Procarbazine

Velban

Vinblastine

Vincristine

VP-16

Others:

10. Circle current drugs subject has received and write in the dosage and frequency of each drug circled.

<u>Current Drugs</u>	<u>Dosage</u>	<u>Frequency</u>
----------------------	---------------	------------------

Chlordiazepoxide

Compazine

Imipramine

Lorazepam

Meperidine

Perphenazine

Phenergan

Phenobarbital

Propranolol

Thorazine

All Others

not listed:

Appendix J

TNM Staging of Lung Cancer

T (Primary Tumor)

TIS = Carcinoma in situ

T1 = Tumor is less than or equal to 3.0 centimeters in greatest dimension surrounded by lung or visceral pleura, and without evidence of invasion proximal to a lobar bronchus at bronchoscopy.

T2 = Tumor is greater than 3.0 centimeters in greatest dimension, or a tumor of any size that either invades the visceral pleura or has associated atelectasis or obstructive pneumonitis extending to the hilar region. At bronchoscopy, the proximal extent of demonstrable tumor must be within a lobar bronchus or at least 2.0 centimeters distal to the carina. Any associated atelectasis or obstructive pneumonitis must involve less than an entire lung.

Appendix J (continued)

T3 = Tumor of any size with direct extension in the chest wall, diaphragm, or the mediastinal pleura or pericardium without involving the heart, great vessels, trachea, esophagus or vertebral body, or a tumor in the main bronchus within 2.0 centimeters of the carina without involving the carina.

T4 = A tumor of any size with invasion of the mediastinum or involving the heart, great vessels, trachea, esophagus, vertebral body or carina or the presence of malignant pleural effusion.

N (Regional Lymph Nodes)

No = No demonstrable metastasis to regional lymph nodes.

N1 = Metastasis to lymph nodes in the peribronchial or ipsilateral hilar region, or both, including direct extension.

N2 = Metastasis to ipsilateral mediastinal lymph nodes and subcarinal lymph nodes.

N3 = Metastasis to contralateral mediastinal lymph nodes, contralateral hilar lymph nodes, ipsilateral or contralateral scalene or

Appendix J (continued)

supraclavicular lymph nodes.

M (Distant Metastasis)

Mo = No known distant metastasis

M1 = Distant metastasis present - Specify
site(s).

Using this criteria, lung cancer is staged as follows:

Stage 0 = TIS carcinoma in situ.

Stage I = T1 No Mo

T2 No Mo

Stage II = T1 N1 Mo

T2 N1 Mo

Stage III a = T3 No Mo

T3 N1 Mo

T1-3 N2 Mo

Stage IIIb = Any T N3 Mo

T4 Any N Mo

Stage IV = Any T, Any N, M1

Appendix K

Time Table For Research Study

Time 0 = within 72 hours prior to chemotherapy treatment.

- Consent obtained from subject.
- POMS tool completed by subject.
- Treatment Related Side Effects tool completed by subject.
- Perceived Stress instrument completed by subject.
- Demographic Data Sheet completed by researcher.
- Forms of Coping instrument (pre-treatment version) completed by subject.

Time 1 = 72 hours before the second chemotherapy treatment.

- POMS tool completed by subject.
- Treatment Related Side Effects tool completed by subject.
- Perceived Stress instrument completed by subject.
- Demographic Data Sheet updated by

Appendix K (continued)

researcher.

- Forms of Coping instrument (post treatment version) completed by subject.

Time 2 = 72 hours before the third chemotherapy treatment.

- POMS tool completed by subject.
- Treatment Related Side Effects tool completed by subject.
- Perceived Stress instrument completed by subject.
- Demographic Data Sheet updated by researcher.
- Forms of Coping instrument (post treatment version) completed by subject.

Time 3 = 72 hours before the fourth chemotherapy treatment.

- POMS tool completed by subject.
- Treatment Related Side Effects tool completed by subject.
- Perceived Stress instrument completed by subject.
- Demographic Data Sheet updated by researcher.

Appendix K (continued)

- Forms of Coping instrument (post treatment version) completed by subject.

Time 4 = 72 hours before the fifth chemotherapy treatment.

- POMS tool completed by subject.
- Treatment Related Side Effects tool completed by subject.
- Perceived Stress instrument completed by subject.
- Demographic Data Sheet updated by researcher.
- Forms of Coping instrument (post treatment version) completed by subject.
- Expression of appreciation to the subject from the researcher for participation in this study.

Appendix L

Canonical Correlations Between Mood and Coping at the Time
of Pre-treatment

	Eigen	Canonical			
<u>Number</u>	<u>value</u>	<u>correlation</u>	<u>Chi-Square</u>	<u>df</u>	<u>p</u>
1	.40	.63	28.28	35	.78
2	.23	.48	17.23	24	.84
3	.19	.43	8.23	15	.91
4	.10	.32	3.81	8	.87
5	.08	.27	0.52	3	.91

Appendix M

Canonical Correlations Between Mood and Coping at the Time
of Treatment Two

	Eigen	Canonical			
<u>Number</u>	<u>value</u>	<u>correlation</u>	<u>Chi-Square</u>	<u>df</u>	<u>p</u>
1	.47	.68	23.92	35	.92
2	.30	.55	8.83	24	1.00
3	.10	.32	4.45	15	1.00
4	.07	.26	1.46	8	1.00
5	.03	.15	0.49	3	.92

Appendix N

Canonical Correlations Between Mood and Coping at the Time
of Treatment Three

	Eigen	Canonical			
<u>Number</u>	<u>value</u>	<u>correlation</u>	<u>Chi-Square</u>	<u>df</u>	<u>p</u>
1	.44	.67	27.98	35	.79
2	.26	.51	15.70	24	.89
3	.13	.37	9.73	15	.84
4	.11	.33	4.89	8	.77
5	.06	.24	2.31	3	.51

Appendix O

Canonical Correlations Between Mood and Coping at the Time
of Treatment Four

	Eigen	Canonical			
<u>Number</u>	<u>value</u>	<u>correlation</u>	<u>Chi-Square</u>	<u>df</u>	<u>p</u>
1	.43	.65	36.30	35	.41
2	.34	.58	19.23	24	.74
3	.22	.47	8.66	15	.89
4	.12	.35	3.37	8	.91
5	.07	.26	0.50	3	.92