CHEMOTHERAPY

A HANDBOOK FOR CANCER PATIENTS

A project submitted in partial satisfaction of the requirements for the degree of Master of Arts in Education, Educational Psychology, Counseling and Guidance

by

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ABSTRACT

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The purpose of this booklet is to provide a concise, clear vehicle to enlighten and educate the cancer patient who will receive chemotherapy.

Many myths circulate about chemotherapy. Some have no basis and others have a thread of factual information that has been exaggerated. Neither one will help the cancer patient or his family to understand and cope with the real side effects of chemotherapy that may occur. From listening to people talk about what can happen as a result of taking chemotherapy, I feel there is a great need for more information to be made available to the person who has been offered chemotherapy for the treatment of cancer.
This booklet focuses on chemotherapy, what it is, how it works, why it is used, different types of chemotherapy, names of drugs, various side effects and methods to control or avoid them. Some history is included to demonstrate that chemotherapy is not a new or experimental method for treating disease.

The discussion of the etiology of cancer is brief. My intent is to give an overview for the patient's knowledge that cancer is not new to civilization. Many people have the idea that cancer is a discovery of the late 20th century. By giving a brief historical perspective and a brief description of the basic types of cancer, including common characteristics of all cancers, I hope to dispel some of these myths. The main objective is to emphasize that each patient is an individual and needs individualized care. Hopefully patients will be encouraged to ask questions about their specific disease and the treatment available for it. By doing this they begin to actively participate in their treatment plan.

A well informed patient is a less anxious patient and will be more optimistic about his treatment. Some of the depression associated with cancer may be relieved by having information about what is happening and why. By removing one of the unknown factors, the patient becomes less fearful and will be better able to cope with the future.
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INTRODUCTION

This booklet is designed to help you and your family understand why chemotherapy is used in the treatment of cancer. Topics that will be included are the concept of cancer in general, how it grows, and how chemotherapy can work for you.

The following pages will explore methods that you and your doctor may use to incorporate chemotherapy smoothly into your lifestyle, and some reasonable expectations that you may have of chemotherapy.

Chemotherapy is not a new or revolutionary discovery. For thousands of years chemotherapy has been used to treat diseases. "Chemo" means drug. "Therapy" means treatment. Aspirin is chemotherapy and so is penicillin. People who have heart disease, diabetes, and high blood pressure take chemotherapy. These chronic diseases are often controlled by chemotherapy. Similarly, many cancers may be controlled by the use of chemotherapy. Some types of cancers can be cured by chemotherapy.

Cancer is a complex, often unpredictable disease. A doctor who is specialized and highly skilled in the detection, observation, and management of cancer is called an Oncologist-Hematologist. Your oncologist works with surgeons and radiotherapists to guarantee the best treat-
ment for you. He manages your treatment from the standpoint of total care. He will observe, recognize, and take action on certain signs and symptoms that indicate whether the cancer is improving, spreading, or staying the same. Based on this information, he will tell you what is best for you. Sometimes he will insist on a certain treatment because he knows it can help. Because cancer is so complex, and may act differently on different people, the oncologist treats each person individually. There are no rigid rules in cancer therapy. Each person is an individual and therapy is individually planned.

When your doctor talks with you about your disease, be sure to ask questions. Find out exactly which type of cancer you have and the names of the drugs that you will receive. Some questions might be: Where did your cancer begin? Do you now have it somewhere else? What does the doctor want to accomplish with the use of these drugs? What are the names of the drugs? What are the side effects? What symptoms should you call to report? What about medications you are already taking? Are there any medications you should avoid? Should you have a special diet? May you have wine or liquor? Are there any restrictions?

Your doctor will advise the best drugs for you and the type of cancer you have. He will tell you why these drugs are chosen for you. Do not compare yourself or
your chemotherapy to another person. Remember, each person is an individual with special needs, and your chemotherapy is chosen for you.

If you have heard stories about chemotherapy, ask your doctor or nurse about them. They can either confirm or correct ideas you may have. Each drug you will receive will be explained to you, including side effects that are possible. Some side effects may not occur, but by being informed about them you will be more comfortable taking the medication. Knowledge on the part of the patient, and the family, helps to develop understanding and mutual trust, which are essential ingredients for achieving good results. Ask your nurse to review with you what you have heard regarding your disease, the chemotherapy, possible side effects, and methods to avoid or ease the side effects. Do not hesitate to ask questions. If you forget or think of something later, jot it down and either ask at your next visit or telephone the office and find out.

Your oncologist may give you chemotherapy as an adjunct to another type of treatment. For instance, say your tumor was removed by surgery but there is a possibility some tiny cancer cells, too small even to be seen by a microscope, may be somewhere else. Chemotherapy will attack those cells, wherever they may be. It is sometimes used before surgery to reduce the size of the tumor.
Chemotherapy can be used alone if a tumor doesn't need to be removed, or if it cannot be removed surgically. You may receive chemotherapy for treatment of cancer that has spread to another part of your body. Chemotherapy is an excellent choice for this because it reaches every part of the body. Wherever cancer cells may be, however small they are, chemotherapy will attack them. Either way, chemotherapy is a powerful weapon for destroying cancer cells.

No matter what you read or hear in the news media, there is no miracle drug or guaranteed cure for cancer, but chemotherapy is effective against many cancers today, and your oncologist will use only what he knows to be helpful in your particular disease. As new drugs are made available that are effective, your oncologist will have them ready to use.
"Cancer" comes from a Greek word, "karkinos", meaning "crab". It describes the way the disease grows. It has been found in skeletons of prehistoric animals and Egyptian mummies. The Ebers Papyrus Papers in 1500 B.C., describe symptoms and primitive forms of treatment for cancer. Hippocrates, in 400 B.C., described cancer in different body organs and gave us the term "carcinoma". In the 17th century a French surgeon, Henri Ledran, showed how the illness travels through the lymph system to different parts of the body. The first cancer hospital was founded in France in the 18th century.

Thirty-five years ago, major research began, and ten years ago cancer research became a national priority. Today, great steps are being taken to detect cancer early, and to control it successfully.

Today, the term cancer is used to describe more than one-hundred distinct diseases. It occurs in all races and ages of man, and in all animal species. Cancer cells are characterized by their ability to live and reproduce without any orderly purpose, and in defiance of the body's growth control mechanism, which prevents normal cells from over-producing. Normal cells have a definite life span and regularly produce new cells to keep a balance.
The unregulated growth of abnormal cells crowds out normal cells, forming tumors and sometimes travelling through the blood or lymph system to different parts of the body, thereby creating new tumors. When tumor cells go to another part of the body, it is called "metastasis". This can happen immediately or years later. Our goal is to stop this destructive course.

Today, cancer is understood and described according to its original location and the type of cell from which it arises. Location may be breast, lung, or another organ. These are usually "carcinomas" beginning in the glandular or lining cells of the body. It may be connective tissue such as bone or muscle, called a "sarcoma". "Leukemias" are from the blood forming tissues. "Lymphomas" arise from the lymphatic system.

No two patients are alike even if they both have the same cancer. Do not compare yourself to another cancer patient. Each person responds to cancer differently and is treated accordingly.

The cell type is determined by a specially trained doctor who looks at slides of tumor cells under a microscope. Different types of cells grow and spread in different ways. They may be slow growing or fast, orderly or haphazard, local or spreading to other parts of your body. Because of the unpredictable nature of cancer cells, sometimes your doctor cannot tell you how long you will
have to take a certain type of chemotherapy. Your treatment plan may change as your needs change. Some cancers are quickly controlled. Others may take longer to control.
CHEMOTHERAPY: THE WEAPON

Chemotherapy, as mentioned earlier, is treatment with medication. Anti-cancer chemotherapy works in two ways to fight cancers: 1. It blocks the growth of new cancer cells. 2. It kills cancer cells directly.

Chemotherapy used in the treatment of cancer may be a single drug or a combination of drugs. Methods of administration include taking a pill by mouth, receiving an injection into a muscle (IM), and receiving an injection into a vein (IV). Your therapy may include one or all of these methods. The intravenous method may be used by hanging a bottle and the medication dripping through a tubing into the vein, called an infusion, or your doctor or nurse may inject the medication directly into the vein. Your doctor may decide to hospitalize you while you receive the chemotherapy. There are some chemotherapy treatments that require a week-long infusion, or a few days infusion, with a bottle hanging at the bedside. However, most chemotherapy can be given in the office taking only a few minutes of your time.

Keep in mind that a small pill may be as effective as a lengthy infusion, depending on the type of cancer being treated. In some cases, a combination of drugs has been proven most effective. This is because different
drugs work at different times in the dividing cell. Below is a picture of the cell cycle. Each stage of the cycle has an important part to play in the growth and division of the cell. When one phase is interrupted the cell cannot divide and will die.

The cell cycle is the life of a cell. Here it is born, grows, and divides. There are four main phases: mitosis, G₁ (gap 1), synthesis, and G₂ (gap 2). In mitosis the cell divides and becomes two cells. After division the cell goes into G₁ or gap 1, a resting phase. Here the cell may also be using some protein. At this point the cell can go into G₀, called "out of cycle". Here it is safe and resting completely. When the cell comes back into the cycle it can be killed by chemotherapy. After G₁ the cell goes into the S phase, or synthesis. This means it is "building up and putting together" all the materials necessary for its growth and
is getting ready to divide. The comes $G_2$, another resting period for building strength to divide. Then, mitosis happens again.

Anti-cancer drugs attack the cells in all parts of the cell cycle. Some break down parts of the cell, some interrupt the growth of the cell, some simply use the food a cell needs to grow and divide.

Since normal cells are affected too, the drugs are given at intervals to allow normal cells to repair themselves. Normal cells repair faster than cancer cells, so the drugs are continually working against cancer cells.

There are basically five types of chemotherapy drugs. Each type acts in a specific part of the cell cycle doing its part to kill tumor cells. Within each type are several specific drugs. This is why combination drugs are often used and why they are given on a specific schedule. By giving more than one drug, a greater number of tumor cells can be killed at a time.

Research and development of chemotherapy drugs has been underway for many years. As long ago as 1500 B.C., the use of drugs in cancer therapy was recorded. The first effective use of a drug was reported in 1865. In 1919, during World War I, mustard gas was reported to cause a decrease in the white blood cells of soldiers, and this led scientists to begin the use of nitrogen mustard in the treatment of human malignant disease in
the 1940's. From these beginnings modern chemotherapy has been developed. Some people used existing drugs and refined them. Others have been discovered by scientific research done at the National Cancer Institute and laboratories all over the world. Out of research has come thousands of drugs, but because of rigid tests and high standards, only a few are selected for human use. To get that far, a drug has to be proven beyond any doubt that it is effective and that its side effects are not too harsh.

In the past 15 to 20 years more and more scientists are devoting their lives to cancer research and are working to develop new and better chemotherapy drugs.

Types of Chemotherapy and Specific Drugs

1. Alkylating agents are nonspecific and can kill cancer cells in all phases of the cell cycle.

2. Antimetabolites interfere with synthesis. They fool the cell into using them instead of its needed food.

3. Antitumor antibiotics interfere with activity in all phases of the cell cycle.

4. Plant alkyloids stop mitosis from happening.

5. Hormones change the environment so the cell cannot continue to live.

Alkylating Agents
Alkylating Agents (continued)
1. Mustargen, HN2, nitrogen mustard (Michlorethamine).
2. Cytoxan, Endoxan, and CTX (Cyclophosphamide).
3. Alkeran, Melphalan, L-PAM (1-Phenylalanine mustard).
5. Myleran (Busulfan).
6. BCNU (Carmustine).
7. CCNU (Lomustine).
8. Methyl-CCNU (Semustine).

Antimetabolites
1. 5-FU (5-Fluorouracil).
2. ARA-C, Cytosar, Cytarabine (Cytosine Arabinoside).
4. 6-MP, Purinethol (6-Mercaptopurine).
5. 6-TG, Thioguanine (6-Thioguanine).
6. Hydrea (Hydroxyurea).

Antitumor Antibiotics
1. Adriamycin, Adria (Docorubicin).
2. Cosmegen, Bactinomycin (Actinomycin D).
3. Mithracin (Mithramycin).
4. Mutamycin (Citomycin C).
5. Blenoxane, Bleo (Bleomycin).
6. Daunomycin, Rubidomycin, Cerubidine (daunorubicin-
Plant Alkyloids
1. Velban (Vinblastine).
2. Oncovin (Vincristine).

Hormones
1. Adrenocorticosteroids (Cortisone-like).
   Prednisone, Decadron, Hexadrol, and Medrol.
2. Estrogens (female hormones). DES (Diethylstilbestrol), TACE (Stilphosterol).
3. Antiestrogen - Tamoxifen (Nolvadex), Nafoxidine, Clomiphene.
4. Androgens (male hormones), Halotestine, Depo-testosterone, Deca-durabolin, TESLAC, and Methosarb.
5. Progestationals - Megace, Delalutin, Depoprovera.

Side Effects: Cause and Management
Side effects are caused by the action of the anti-cancer drug on normal cells. Cells that divide and multiply rapidly are the ones most easily affected. These include the cells in the mouth, stomach, and intestine, the bone marrow, where blood is produced, the hair follicles, and the skin. Muscles and nerves can also be affected by some drugs and certain sexual characteristics may change with other drugs.

Some of the side effects can be avoided or lessened.
Most are tolerable and temporary. Most are reversible. Keep in mind that each person is an individual and the drugs will effect each person to a different degree. Each drug is known to be responsible for certain side effects, but any drug may cause a side effect in one person and not in another. For instance, if two people are on the exact same drug, one may have nausea and the other may have no symptoms at all. Do remember, there is no relationship between side effects and drug effectiveness. Some drugs have few or no side effects.

Side effects usually do not interfere with your normal living, and most patients say they can put up with the inconveniences for the benefits of chemotherapy. Side effects do vary, but your doctor will discuss the possible side effects of each drug that you will receive. Your doctor or your nurse will be able to give you some suggestions for lessening the side effects if they do occur. It would be a good idea to take some notes so that you will have accurate information about what the doctor or nurse says to refer to later.

Stomach or intestinal side effects may or may not be a problem. Usually they are temporary and easily treated. Nausea, vomiting, and diarrhea are usually treated after they begin. However, if your doctor suspects you will have these, he may tell you to take something to prevent it. For instance, if a particular patient has nausea, he
can take his anti-nausea pill before receiving chemotherapy, and regularly for several times afterwards, thereby avoiding the nausea. Many drugs are available for this problem and your doctor can prescribe one for you. If the side effects are quite bothersome, he may prescribe a sedative so you can go home and sleep for several hours during the time the symptoms are most likely to happen.

Some helpful hints may include eating lightly before your treatment and eating smaller amounts of food at more frequent intervals when you don't feel well. Three meals a day may not appeal to you. Some people use a food supplement to help keep their nutrition adequate. Ask your doctor or nurse about these. They can tell you the different kinds and some suggestions about how to use them.

If diarrhea is a problem, adjust your diet to eating constipating foods such as cheese, lean meat, fish, and boiled milk. Drink plenty of fluids to replace those lost with the diarrhea. If you have frequent watery stools you should notify your doctor. He may order medication for you.

If you are constipated stay away from constipating foods and eat plenty of fruit and other foods high in fiber. You may need to take a stool softener. If you become too uncomfortable notify your doctor, who may have other suggestions.
Occasionally a sore mouth will develop. If you find that you have a bad taste in your mouth, extra attention to good mouth hygiene may relieve this. A bland mouth wash and a soft bristle tooth brush are good to use. You can mix two teaspoons of salt and one quart of water to make a mild mouth wash and gargle. If you notice a burning sensation in your mouth when you eat or drink something acid, like orange juice, notify your doctor. You may need a prescription to relieve those symptoms.

Food may not taste the same. To improve the taste of food you might use different spices and flavorings. Feel free to experiment, and remember, you are a special individual and what works for you may not work for another person. Also, keep in mind a ravenous appetite may follow a few days of having no appetite at all. Unless you are on a special diet, eat what you want and what you like.

Side effects of the bone marrow or blood producing cells are usually found by the doctor reading a blood test. Blood is made in the bone marrow, so when the chemotherapy affects this area a decrease in the blood count may occur. Every time you are scheduled to receive chemotherapy, a blood count will be done. Your red blood cells, white blood cells, and platelets will be checked. Red blood cells carry oxygen throughout the body, white blood cells fight infection, and platelets help clot the blood. It is expected, and in some cases
desirable, that a decrease in one or all of your blood cells may occur. If this should become lower than desirable, your doctor may not give your chemotherapy that particular day. There are limits to everything, and in the administration of chemotherapy, the same holds true. If your white blood count, or platelets, reach that limit, the doctor may choose not to give chemotherapy until your next visit, when another blood count will be done. Since the blood cells usually repair themselves rapidly, the blood count will probably be satisfactory and the chemotherapy will be given at your next visit. Precautions are taken because we don't want the white blood count to be too low to fight infection, nor the platelets too low to clot the blood. It is a good idea while taking chemotherapy to avoid unnecessary contact with severely ill people. Any sign of infection such as temperature, cough, or headache should be reported to your doctor. Also, if anything like a boil or a cut should occur, it would be wise to tell him about it.

You may notice an increase in bruising. This may be due to decreased platelets, although it does not necessarily mean they are too low. If you notice any blood in your urine or bowel movement report it promptly to your doctor. This could be related or not, but it is important that you tell your doctor immediately.
If you notice excessive weakness, fatigue, or shortness of breath, report it promptly to the doctor. Again, this may or may not be related to the chemotherapy, but it is important. If it is related, you may be anemic and may need additional iron, or sometimes a blood transfusion. This is not at all common though because all blood cells rapidly produce new cells and usually return to normal without outside assistance.

Mention any problem or unusual happening to your doctor. It may be a correctable side effect of the chemotherapy or it may be unrelated to either your disease or chemotherapy. People receiving chemotherapy do have simple problems unrelated to either.

Hair loss is a matter of concern. First, hair will return, sometimes before the treatments are completed. Second, it is usually stronger, fuller, a different texture, and curly if it was originally straight. Hair loss occurs because the hair follicles are made up of rapidly growing cells and the chemotherapy affects them. Loss may include hair of the armpits, eyelashes, eyebrows, pubic areas, legs, and beard, as well as from the scalp.

The psychological meaning of hair is extremely important. Women equate their hair with femininity and men with masculinity. Seeing themselves with less and less hair is a shocking sight. A person's image of himself is challenged. This is a natural feeling. Some people
decide "not to worry about it", "enough is enough". It is something else to worry about though, and people do different things about it. Some get wigs or a toupee. Some wear scarves. Some men shave their heads, and some women get a short, curly hairdo to help hide their thinning hair. Yes, permanents are o.k. They will not damage the hair at the root level. Hair that is going to come out will anyway, and a curly hairdo will "cover-up" bare spots.

Some drugs may have a slight to total effect on the hair. Others may be guaranteed to cause hair loss. There is a method to help prevent hair loss for the former. It is a "scalp tourniquet" applied just prior to the injection and left in place for about five minutes afterwards. This prevents high concentrations of the drugs from reaching the hair follicles and causing as much hair loss. Some patients wouldn't be without it, and others don't feel the results are that great. Like everything else, it is individualized, what works for some does not work for all.

Skin changes may be in the form of darkened paths along the vein (as in the case of 5-FU), sore tongue, dry flakey skin, tender fingertips, or canker sores on the side of the mouth. Not all drugs cause skin changes, and in those that can, not all patients who receive those drugs get skin changes. Those that do occur are temporary, treatable, and usually disappear when therapy is stopped.

Muscle and nerve effects can be muscle weakness,
unsteadiness in walking, and a tingling or numb sensation in the fingers or feet. Most people who notice any of these are not strongly affected and consider it mostly an inconvenience. Some don't even notice. If you do notice, tell the doctor and he can decide whether this is a chemotherapy side effect or something else, and then plan accordingly. If it is a reaction to a drug, it will probably go away when the drug is stopped or the dosage is changed.

Hormones, or cortisone agents, may effect women by their menstrual periods becoming irregular or ceasing completely. Not having periods does not mean they cannot get pregnant, so birth control should be used. Chemotherapy could have harmful effects on an unborn child. If they desire children after chemotherapy is completed, their physicians can advise when this would be safe.

Women approaching menopause or who have reached menopause, may have hot flashes or some vaginal bleeding while taking the chemotherapy. Women taking male hormones may have some masculinizing effects, such as deepening of the voice and some hair growth. They also experience an increase in appetite, muscle strength, sexual desire, and possibly a minor change in body shape. A dosage adjustment will usually alleviate these symptoms. Depending on the patient's physical features, these symptoms may or may not be noticeable. Some women have low voices anyway and
attention to diet, exercises, and weight will help retain her figure. Discuss these and any side effects that you may have or have heard about with your physician.

Men who are taking female hormones (estrogen) may experience a reduced sexual desire and some enlargement of their breasts. A small dose of radiation to that area may help to prevent the enlargement. Some men may notice a thinner beard and a rounder, somewhat fatter body shape. Usually these changes are only noticeable to the patient himself. These slight feminine effects occur because the hormones shrink the testes and reduce the male hormones in the body. He will not develop a high voice, nor will his personality change. If the man keeps himself in good physical shape with proper diet and exercise, these side effects may not even be noticed and they may not even occur.

Fertility may be affected by chemotherapy. His sexual ability usually will not be affected, but his sperm count will be reduced. This does not mean he cannot make a woman pregnant, so contraceptive measures should be used. Chemotherapy can be harmful to sperm, and most medical oncologists recommend a year's wait after completion of chemotherapy before planning on becoming a father.

Sometimes fertility will be permanently affected by chemotherapy. When this is the case, sperm banking should
be considered. Ask your doctor about doing this before undergoing chemotherapy. It is possible to freeze sperm and arrange artificial insemination at any time.

Other side effects that may occur are fluid retention characterized by swelling of the ankles or puffiness of the face. Acne, general tiredness, depression, a gaseous feeling, all can be side effects of chemotherapy. Almost all side effects are reversible, controllable, or preventable, so do not hesitate to discuss any symptom or problem that you question.

A few drugs may cause a local, warm, or stinging feeling during injection. Mention this to the physician or nurse who is administering the drug. They will know if this is to be expected and some measures to relieve it. If, a few hours later, redness or a lump appears at the site of injection, report this immediately. Do not hesitate to call the doctor's office for any questions or problems that arise.

A good balanced diet is important for everyone, but especially so for the person receiving chemotherapy. A diet high in protein is necessary because protein is essential for cell building. Red meat is sometimes disliked, but poultry and fish are high in protein, as well as cheese and eggs. The lack of appetite may occasionally be a problem when receiving some chemotherapy drugs. Homemade soups, puddings, yogurt, and foods prepared in a
blender are often excellent when the patient is temporarily tired or not hungry. Remember to eat small amounts during these times.

Another concern is emotions. Depression, anger, anxiety, and even euphoria are common emotions for the cancer patient. While it is generally agreed that the optimistic person tolerates chemotherapy better, everyone has periods of depression. Even the person who has a positive approach will occasionally become depressed. This is not uncommon. Every visit to the doctor's office is a reminder that he is living with cancer. Some people like to forget, or feel so well that they go about their normal routine and do forget they have cancer until it is time for the visit to the doctor's office. Suddenly, they have to think about it, and some will get depressed.

Some people have another person that they confide in. Some prefer a professional counselor. No matter who you choose, talking over the fears and concerns in general can be a great help.

Hopefully, knowledge about your disease and the treatment for it will help allay fears and relieve depression. A well informed patient who participates in his treatment plan will have a more optimistic view, and will be better able to fight the disease.
GLOSSARY

Adjunct - Treatment usually given in addition to survey, when no evidence of cancer is present.

Hematologist - A physician who specializes in the treatment of problems concerning the blood.

Malignant - Growth without order or control.

Metastasis - Transfer of the cancer of one body part to another body part.

Mitosis - The division of a cell, making two identical cells.


Synthesis - Building up and putting together.

Lymph System - The lymphatic system is part of the circulatory system and carries a clear fluid through lymphatic vessels to all parts of the body.