Institute for Christian Teaching
Education Department of Seventh-day Adventists

LIFESTYLE, DIET AND CANCER PREVENTION

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Prepared for the
20th International Faith and Learning Seminar
Hope and Wholeness:
Faith, Learning, and the Health Sciences
held at
Loma Linda University, Loma Linda, CA 92350
June 15-27, 1997

INTRODUCTION

Cancer is the leading cause of death in the United States, second only to cardiovascular diseases (Parker, et al., 1997). Every year there are approximately 7 million new cancer incidences worldwide (Alberts, 1994). In Trinidad and Tobago, cancer is the second leading cause of death after diabetes. The four organs of the body most affected by cancer in Trinidad and Tobago are the breast, cervix, prostate and lung (Dhanessar, 1995). In the Caribbean region, the most common types are cancers of the prostate, breast, cervix, lung, and stomach (CAREC, 1996). In the United States, and according to the cancer statistics by the American Cancer Society, by 1997 the most common cancers in man will be cancers of the prostate, lung and bronchus, colon and rectum, and among women, the three most commonly diagnosed cancers will be cancers of the breast, lung and bronchus, and colon and rectum. These estimates mean that in 1997, the estimate of new cases of invasive cancers which are expected to be diagnosed in USA is about 1,382,400 (Parker, et al., 1997).

Cancer is not a single disease but a group of more than 100 types of genetically different multi-factor and multi-stage diseases (DeVita, et al., 1997). Environment, genetics, lifestyle, nutrition and diet, all have a part to play in either the initiation, promotion, or progression stage of cancer development (Baltimore, et al., 1995). This multistep nature of carcinogenesis offers many opportunities for chemopreventive interventions with agents targeted to specific mechanisms involved (Greenwald and Kelloff, 1996). Statistics show that chemical and environmental factors, including diet and lifestyle, may be responsible for causing 80 to 90 percent of all cancers (Parker, et. al., 1997; Simone, 1992). This implies that most cancers could be prevented if the factors that

cause them could first be identified and then controlled or eliminated.

After studying data on all deaths caused by cancer, from cancer at specific sites, and on deaths caused by cancer according to age, race, and sex from 1970 to 1994 in the USA, Bailar III and Gornik (1997) calculated age-specific mortality rates and adjusted them to the age distribution of the USA population in 1990. The results show that age-adjusted cancer mortality in 1994 was 6.0% higher than the rate in 1970. They then conclude that the war against cancer still has a long way to go and the effect of new treatments for cancer on mortality has been mostly disappointing. To them, the most promising approach to the control of cancer is a national commitment to the prevention and a concomitant distribution of the cancer research funding focus.

Developed countries, such as the USA, are looking at prevention as one of the efficient methods to fight cancer. These methods include the change towards vegetable-based diet (ACS, 1996; Newmark, 1996), increase of dietary fibers intake, decrease of total fat and calorie intake (McKeown-Eyssen, et al., 1994), regular exercise (Duncan, et al., 1997), and decrease of alcohol and cigarette consumption (Cole and Rodu, 1996; Riboli, et al., 1996). Meanwhile, in the Caribbean, countries are adopting the typical lifestyle and diet of the 19th and 20th century North Americans. From my personal observation in the Caribbean area, this happened simultaneously with the introduction of US television satellite and cable programs in the homes of the Caribbean people about five years ago. At the same period of time, cancer incidence increased proportionately (CAREC, 1996). This can present a potential health problem in the membership of the Seventh-day Adventist (SDA) Church in the InterAmerica Division because its membership is the largest among the world Divisions of SDAs. The overall religiosity and spirituality of SDA members are generally good; however, these make it essential to educate our College students about cancer and its

prevention. This health message on cancer prevention, along with the three angels' messages, must be carried to all SDA churches in the different islands of the Caribbean, and to the wider communities.

According to recent research and studies in the area of phytochemical and cancer prevention, daily fruits, vegetables and herbs included in our diet actually contain cancer prevention (chemopreventive) properties (AICR, 1996; McKeown-Eyssen, et al., 1994; Potter, 1996; Potter and Steinmetz, 1996; Sugimura, et al., 1996; Wong, et al., 1992a, 1992b, 1992c, 1993a, 1993b, 1996). Adopting a healthful living lifestyle (mainly the abstinence from alcohol and tobacco), regular exercise, adequate rest, and faith in God also contribute to the lowering of cancer risk and enhance the body's immune defense mechanisms against cancer (ACS, 1996; Blalock, 1994; Jensen, 1983; Kaczorowski, 1989; Gardner and Lyon, 1982a, 1982b; Gottlieb and Green, 1984; Highfield, 1992; Larson and Milano, 1997; Risser, 1996; Solomon, 1996). The knowledge and adoption of these will surely help to decrease the risk in the initiation, promotion and progression of cancer and enhance the chance of enjoying health for the sake of the work of God in whatever is done.

The goal of cancer prevention is to enjoy total wholeness of health, not just the absence of disease as defined by the World Health Organization. To the Seventh-Day Adventist, this total wholeness of health should include health reform, prayer, justification by faith, the Sabbath, the Sanctuary, and the three angels' messages which can lead to the development of our optimum well-being and could be offered as perfect service to the benefit of humanity and the preparation of Jesus' second coming. Educators and scientists, in the area of health-related cancer research, have the great responsibility of integrating personal faith and learning. We should be motivated to articulate

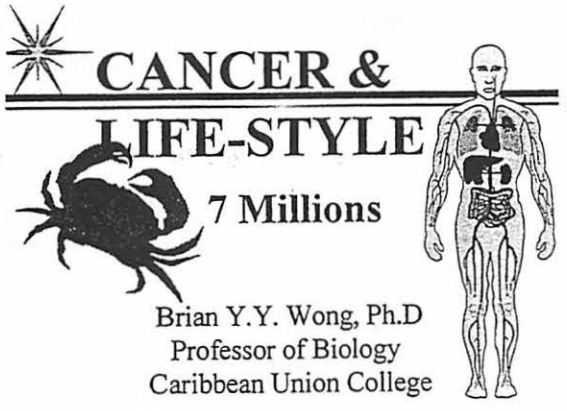
and practise a personal, Christ-centered world view to define beliefs about life- identity, origin, purpose, destiny, problem and solution via the subject of cancer prevention and health. This world view should motivate, stimulate, be passed on, and reflected in each one of our students through the learning and practice of the principles that are taught and lived (Ramal, 1996).

"The integration of faith and learning is a deliberate and systematic process of approaching the entire educational enterprise from a biblical perspective. Its aim is to ensure that students, under the influence of Christian teachers, will have freely internalized biblical values and a view of knowledge, life, and destiny that is Christ-centered, service-oriented, and kingdom-directed" (Rasi, 1997). Thus, the purpose of this paper is to present the topic, "Lifestyle, Diet, and Cancer Prevention" as a means to integrate faith and learning among students who are studying courses such as "Topics in Cancer Biology", "Cell and Molecular Biology", "Anatomy and Physiology", "General Microbiology", and "Foundation of Biology" at Caribbean Union College. After students have understood the concept, managed the basic knowledge and principles, internalized and connected their faith in God through the topic taught in these courses, they will be motivated and become the messengers to connect their various home churches and communities of the Caribbean to the health and life giving-God (Palmer, 1993). Besides the practical health application, appropriate spiritual lessons can be illustrated by the multi-stage and multi-factor nature of cancer formation and the chemopreventive properties of phytochemicals in fruits and vegetables in cancer prevention.

This paper is developed as an educational presentation in a way that students would be taught and in turn be able to adopt as their tools to share with others. Forty slides consisting of diagrams, charts, and key notes are provided to enable students to make overhead transparencies or large

pictures for their own presentations in the future. Original animated computer slide presentation prepared by the author in Window 95 using Microsoft Power point 7.0 is also available upon request. Students should have the appropriate projector which could be connected to the computer for presentation. Included is a brief description and explanation of each slide. These 40 slides can be divided into four half-hour or six fifteen-minute presentations. It is the intention and prayer of the author that students will begin to organize these cancer prevention talks, in cooperation with the theology students, to run health evangelism in Caribbean Union College and the communities under my supervision so that they will be matured before they graduate and return to the field to share this health message in their islands.

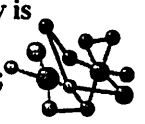
PRESENTATION



Slide 1. Cancer means "crab" in the Greek language. It was Galen who first coined the English term cancer to describe different forms of tumor or neoplasm (DeVita, et al., 1997). In fact, malignant cancer is just like an invasive crab spreading out its killing appendages to destroy the surrounding normal tissues and organs. Every year there are approximately 7 million new cases of cancer world wide. In the United States alone, there are about 1500 people dying with cancer every day and cancer accounts for about one of every five deaths from all causes. In time, about 30% of Americans now living will develop cancer and it will affect about 3 out of 4 families. It is the second major leading cause of death next to cardiovascular diseases in the United States and most countries especially developed and developing countries. Yet, up to 80-90% of all types of cancers are caused by lifestyle, diet and environmental factors. Due to improvements in early detection and treatment, the 5-year survival rates of cancer are about 50% for the leading types of cancer, with the exception of cancer of the pancreas, ovary and lung (Parker, et. al., 1997; Pruitt and Stein, 1994; Simone, 1992).

OUR BODY
GOD'S PERFECT CREATION

I praise you, O Lord, for this body is incredibly and wonderfully made. You shaped me before I was born; You put my bones together while I was still in my mother's uterus. Nothing took place during my development that You didn't know.



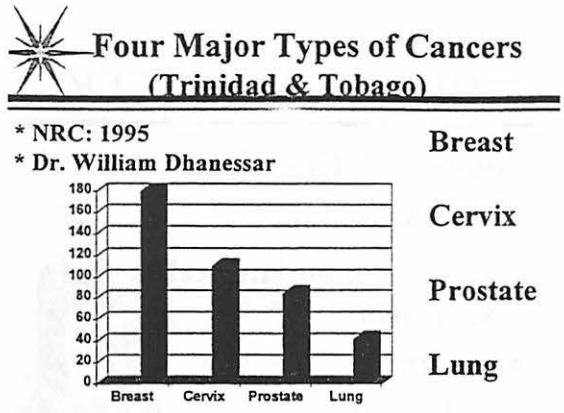
You knew how long I would live even before I was born. Your whole creation is a marvel, and I know that it all didn't just happen. If I wanted to count the times You have thought of me, it would be like counting the sand on the seashore. **Psalm 139:13-18**

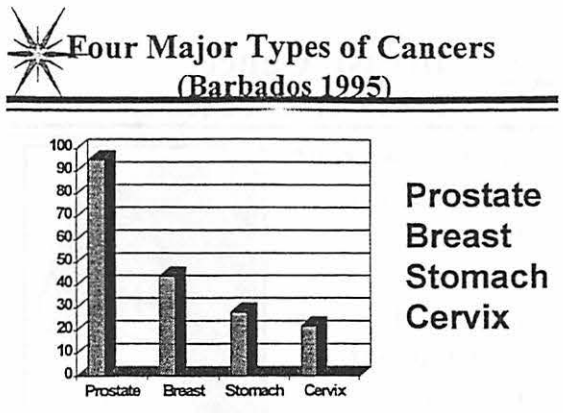
Slide 2, 3. In the Bible, King David reminded us that our bodies are God's perfect creation. God designed all our development. He wants us to live a meaningful life according to His plan and He remembers us all the time (Blanco, 1994). This portion of the Psalms reminds us that God knows what is best for our bodies and He loves us. He wants us to learn about how to take care of our bodies so that we can live out His plan for us. This lecture is a means of helping everyone to learn more about God's plan for our health via the topic of "Lifestyle, Diet and Cancer Prevention".

Lecture Outline

- **What is Cancer**
- **Kinds of Cancer**
- **Origin of Cancer**
- **Cancer Risk Factors**
- **Warning Signs of Cancer**
- **Cancer Prevention**
- **Phytochemicals & Chemoprevention**

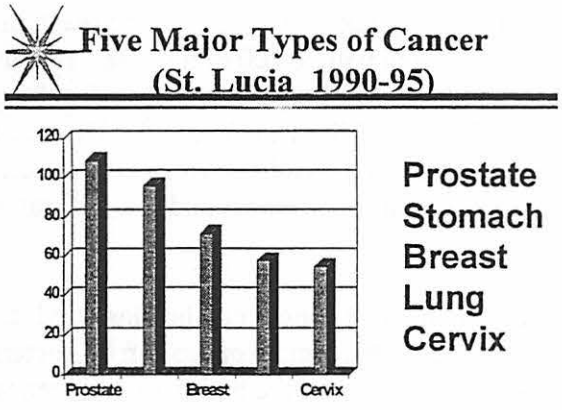
Slide 4. This lecture will follow these 7 major topics. We will first define what is cancer and classify major kinds of cancer. Then we will see how cancer begins and develops. After understanding these, we should be able to identify some of the major risk factors and warning signs of cancer. Finally, suggestions on cancer prevention through lifestyle, and diet modifications will be made based on the above discussion. Emphasis will be placed on the natural chemicals contained in our daily fruits, vegetables, and Chinese herbs which contain cancer prevention properties. It is my hope that these will further strengthen the practice of a vegetable-based or vegetarian diet.

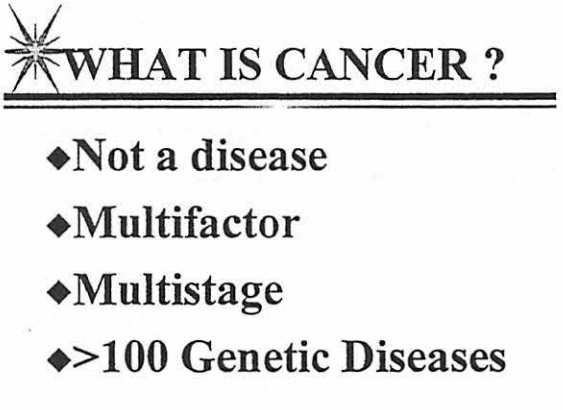




Slide 5. The following 3 slides on cancer statistics will illustrate the types of cancer and their trend in three major islands of the Caribbean. According to Dr. Dhannessar (1995), director of National Radiation Center in Trinidad, cancers of the breast, cervix, prostate and lung are the four leading types of cancer the Center treated during 1995. The actual figure should be much bigger than what is shown here because many cancer patients in the Caribbean region had sought treatments else where in the United States and England.

Slide 6. According to the Barbados Ministry of Health (1995), cancers of the prostate, breast, stomach, and cervix were the four leading types of cancer in the island. In this country, prostate cancer out-numbered breast, and stomach cancer.





Slide 7. The leading types of cancer in the island of St. Lucia were very similar as compared with the previous two. Based on the data provided by the island's Cancer Society (1995), cancers of the prostate, stomach, breast, lung and cervix were the five leading types of cancer in the island as revealed by the accumulative death cases from 1990-95.

Slide 8. Cancer is not a single disease. It is a group of more than 100 types of genetic diseases with uncontrolled growth and spread of abnormal cells. They are multi-factor and multi-stage diseases (Baltimore, et al., 1995; DeVita et al., 1997).

Breast Cancer
Brca 1(ch 17), 2 (ch 13)

- Mammogram <30%
- Visible on X-ray:
- 100,000,000 Cells
- 4-6 mm
- Palpable: 12-40 mm
- 1,000,000,000 Cells
- Death: 100 mm
- 1,000,000,000,000

ORIGIN OF CANCER

Biological, Chemical, Physical

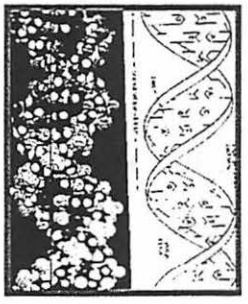
- DNA Mutation
- Clusters of mutated cells : Neoplasm
- Benign
- Malignant

Slide 9. Breast cancer can be used to illustrate the above concepts about cancer. In order for the normal breast tissue cells to change to abnormal uncontrollable growing tumor cells, the tumor suppressor genes Brca 1 of chromosome 17 and Brca 2 of chromosome have to be mutated (Blackwood and Weber, 1996). A mutated single cell will take about 10 to 15 years to multiple to around 100,000,000 cells, which will be a small tumor with a size between 4 to 6 mm. At this stage, it should be visible on a mammogram by soft tissue X-ray. As a matter of fact, this technique could detect up to 30% of early breast cancer cases. Among the 1997 guidelines for the early detection of breast cancer, American Cancer Society recommends annual mammography for women beginning at age 40 (Leitch, et al., 1997). Once the tumor gets to this stage, and if it is malignant, it would increase very fast into a billion in number and approximately 12 to 40 mm in diameter. It should be palpable by self examination or by a physician. It only takes about 5 years to reach this stage. By the time the tumor grows into 1000 billion cells, the size will be 100 mm in diameter and large number of tumor cells would spread into vital organs like the axillary lymphatic nodes, lungs or bones. The disfunctioning of these vital organs would be fatal (Alberts, et al., 1994; DeVita, et al., 1997). This can compared to the development of the rejection of the Holy Spirit and the yielding to temptation in our life. It starts gradually and finally going to a situation beyond our realization and control.

Slide 10. Factors resulting in the early development of cancer can be classified into three major groups, namely: biological, chemical, and physical. Biological group can be bacteria and viruses, the chemical group can be exogenous (originated outside of the body) or endogenous (inside) such as chemicals formed during regular cell metabolism and in the incomplete burnt fossil fuels, cigarette smoke, peanut fungus, food additives, over-cooked and barbecue meat products, and the physical group could include ultra-violet radiation from the sun and X-ray from medical procedures. The factors of these groups will cause deoxyribonucleic acid (DNA) mutation in the chromosome of the cell nucleus. Given appropriate conditions, cluster of mutated cells will be formed. This is called neoplasm, that is tumor, either benign or malignant depending on its growth rate and invasiveness (DeVita, et al., 1997; Sugimura, et al., 1996; Wong, et al., 1992c).

Deoxyribonucleic Acid (DNA)

100 trillion cells
Genotype
Phenotype
100,000 genes
Metabolism
Growth
Heredity



BENIGN TUMOR

- **Non-invasive**
- **Slow growth**
- **Not crossing the Basal Membrane**
- **Localized in capsule**
- **Lipoma**
- **Fibroadenoma**
- **Fibroid**

Slide 11. This picture shows the double alpha-helical ball-and-stick molecular structure and a ribbon model of a piece of deoxyribonucleic acid (DNA). As we know, there are approximately 100 trillion cells in our body containing about 100,000 identifiable functional genes. These segments of DNA, each coding for a specific protein, in turn controls the various metabolism, function, genotype, phenotype and heredity of an individual (Alberts, et al., 1994; DeVita, et al., 1997). These again testify how the unseen molecules are programed by God in our creation to carry out so much different yet coherent functions of various types of cells by the same set of 23 pairs of chromosomes.

Slide 12. The first kind of cancer is called benign tumor. It is characterized by its relatively slow growth and non-invasiveness. The abnormal extra cells are confined by the basal lamina and usually localized in a capsule as illustrated by the picture. Some common ones are lipoma, fibroid and fibroadenoma (Baltimore, et al., 1995).

ADENOMATOUS POLYP

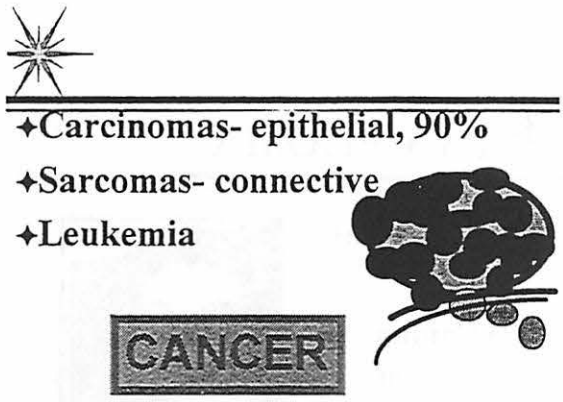
- **Colorectal Cancer**
- **Epithelial**
- **Benign**

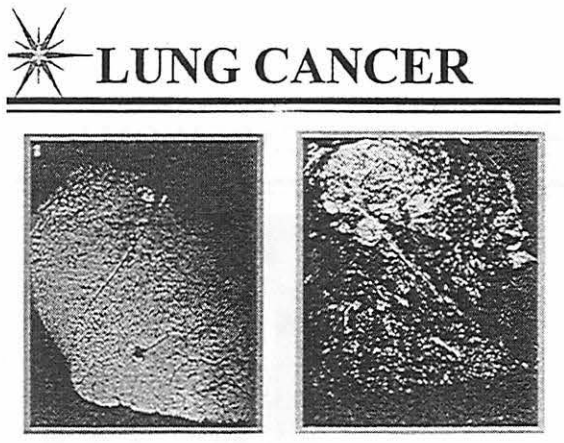
MALIGNANT TUMOR

- **Invasive from primary site**
- **Metastasize to secondary site**
- **Rapid growth**
- **High recurrent rate**
- **Fatal if in vital organs**

Slide 13. Adenomatous polyp is an example of common large intestine benign tumor, which affects people with sedentary lifestyle, high fat, high protein and low vegetable fiber diet. It develops from the epithelial cells of the intestine. With the continuation of the same lifestyle and diet, coupled with mutation and deletion of various chromosome and tumor suppressor gene, such as p53, it has been documented that the majority of this type of benign adenomatous polyps will be promoted and progressed into colorectal malignant cancer. This type of cancer is the second most common cause of death related to cancer in the USA. High intakes of dietary fiber and calcium are suggested as colon cancer inhibitors (Albert, et al., 1994; Bruce and Corpet, 1996; DeVita, et al., 1997; Maclennan, et al., 1995; McKeown-Eyssen, et al., 1994; Potter, 1996).

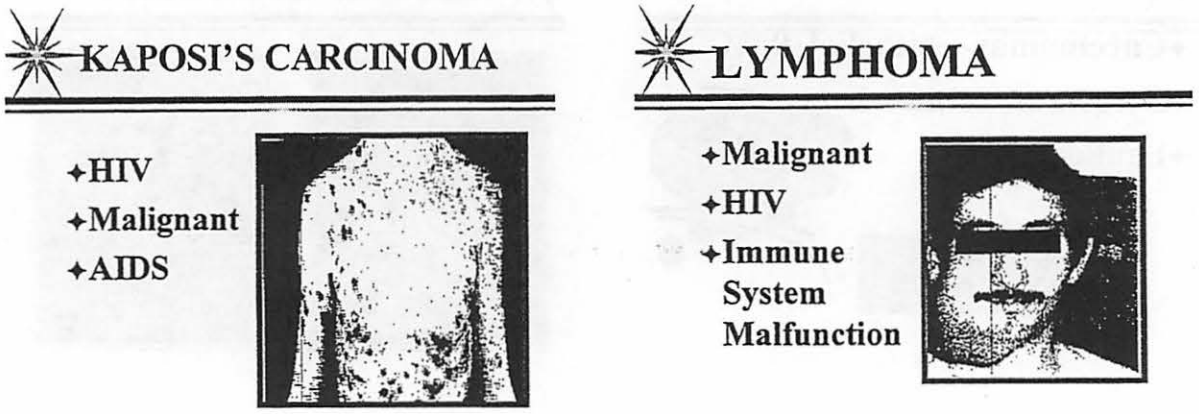
Slide 14. The most significant feature of malignant tumor is the ability of its cells to metastasize from its original primary site to secondary site. Its cells are growing abnormally fast and very invasive through the basal lamina. Even after early detection, followed by successful surgery and treatment, 50% of leading cancer types would only have a survival rate of 5 years. All these make malignant tumor a very life-threatening disease (Pruitt and Stein, 1994; Baltimore, et. al., 1995). This is similar to our loosing our guard towards certain types of temptation and selfish desire. Before long, it will spread over different facets of our lives and interfere with the normal relationship we have with God and man.





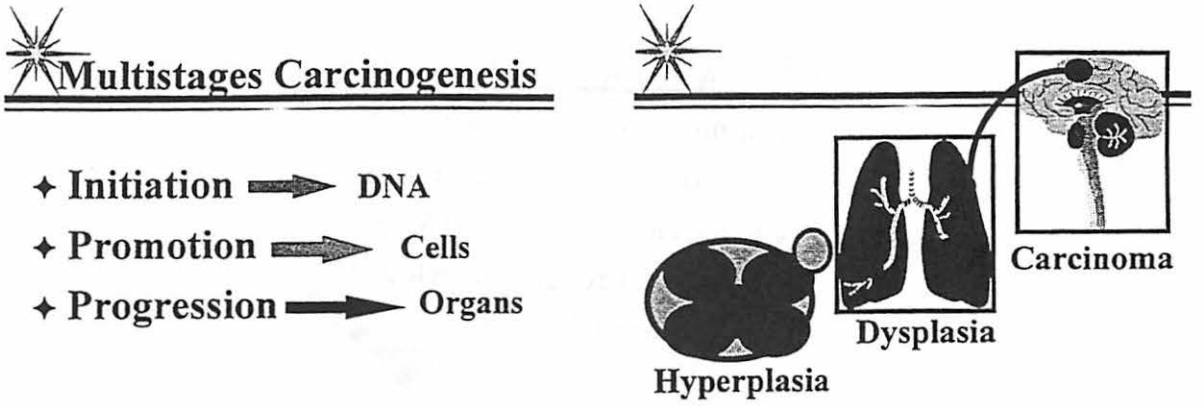
Slide 15. There are three major types of malignant cancer which are recognized according to their tissue origins. These are the "real" cancer. The most important type of malignant cancer is Carcinomas, which originates from epithelial tissues. This account for about 90% of all types of malignant cancer. The next important type of malignant cancer is Sarcoma, which starts from connective tissues, such as muscle and nerve. Leukemia is caused by mutation in the stem cells in the bone marrow that are responsible for the production of normal white blood cells. This is one of the major types of childhood cancer (Albert, et al., 1994; DeVita, et al., 1997).

Slide 16. Lung cancer is the leading cancer of the world and its major cause is the use of tobacco (Harvard Report, 1996; Parker, et al., 1997). The lung on the left of the diagram labeled 1 is a relative normal lung (left lung) with some black spots possibly caused by air pollution. The other picture shows a lung taken out from a heavy smoker. There is a major tumor on the top left corner and upper right side. The whole lung is showing emphysema due to accumulation of tar and destruction of alveoli (Albert, et al., 1994).



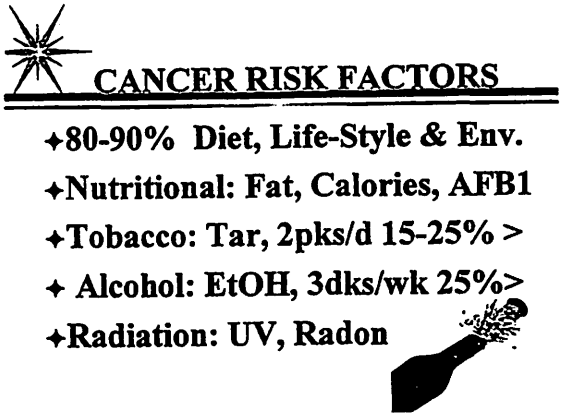
Slide 17. Kaposi's carcinoma is a highly invasive malignant cancer commonly found in elderly Jewish men. This type of skin cancer appears as purplish-brown patches in the skin. It is now found in immunosuppressed relative young person infected by Human Immuno-deficiency Virus. Its appearance is being used by Center of Disease Control (CDC) and World Health Organization (WHO) as one of the criteria to change a HIV positive (carrier) person into an AIDS patient (DeVita, et al., 1997; Wadler, 1990).

Slide 18. Lymphoma is another kind of deadly malignant cancer caused by HIV infection. It can result in the immune system malfunctioning by long-term use of drugs, exposure to chemicals or long-term stress. Often, it is due to secondary invasion of tumor cells from primary sites (DeVita, et al., 1997).



Slide 19. Carcinogenesis is a multistage process which is driven by genetic damage and epigenetic changes. This slide sums up the principle of the three-stages of carcinogenesis. Initiation refers to any process or substances (such as chemical, radiation and virus) that cause mutation of the DNA. These are referred to as initiators. Normal functioning growth proto-oncogene could be activated to become oncogene (cancer gene). It could be due to the mutation of normal tumor suppressing gene, which checks and stops the function of abnormal gene or its products. Inactivation of antimetastasis genes could also be the case. The next promotion stage is (sometimes called conversion) when substances called promoters are present to cause the mutated DNA to be more active and promote the initiated cell to produce abnormal amount of proteins and multiply without control by further selective clonal expansion and proliferation. Defects in terminal differentiation, defects in growth control, or resistance to cytotoxicity will be the results. Cells at this stage could be either hyperplasia (over-growth of relative normal cells) or dysplasia (over-growth of relative abnormal cells) and preneoplastic lesion would be the characteristic appearance. At this precancerous stage, the development is still reversible. The final stage is called progression in which further genetic changes occur in the cancerous cells and these malignant cells continue to show progressive phenotypic changes and genomic instability (such as gene amplification, chromosomal aberrations, and altered gene expression) and metastasize from the primary site via the venous or lymphatic circulation to secondary site or organs. This is always irreversible (DeVita, et al., 1997; Lupulescu, 1996).

Slide 20. Hyperplasia of normal cells, in a primary site, leads to the possibilities of dysplasia. It is during rapid DNA duplication that it is exposed and vulnerable to mutation. One example is the monthly hyperplasia of female breast, ovaries, uterus and cervix under the effect of estrogen and progesterone. Pap smear performed in the early stage is very useful for women to detect cervical dysplasia which frequently leads to carcinoma of the cervix if left untreated. This simple early detection procedure helps to cut down the mortality of this type of cancer significantly. In this illustration, if the dysplasia in the lung is left undetected and untreated, it would most likely progress into carcinoma *in situ* (in the primary site of origin) and later metastasizes to become carcinoma in the brain or other secondary site such as the lymphatic nodes (Albert, et al., 1994; DeVita, et al., 1997; Lorincz, 1996).



Slide 21. Since close to 80 to 90% of cancer are diet, lifestyle or environmentally related, it would be wise for us to look at some of these cancer related risk factors. Then we would be in a better position to cut down the risk of getting cancer (Simone, 1992).

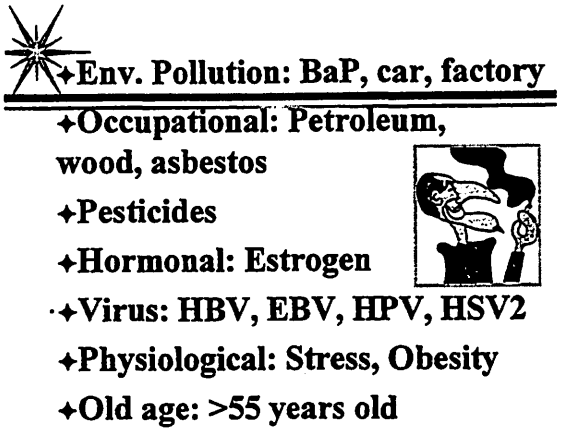
In the tropical countries including the Caribbean countries, Africa, South-East Asia, and Southern China, food contamination by a specific potent hepatocarcinogen (liver cancer causing substance) aflatoxin B_1 (AFB_1) which is produced by the *Aspergillus flavus* fungus. This mold grows on different kind grains, cereals, nuts especially peanut. Liver cancer incidence related to AFB_1 and liver fluke is significantly high. It is wise to keep an eye on any signs of molds in these kind of food or their related products especially peanut butter and peanut oil. Other significant nutritional risk factors to watch out is too much fat and calories. Thess are associated with high incidence of breast cancer and intestinal cancer. Natural estrogen 17-beta-estradiol in the female hormone interacts with lipid which could initiate carcinogenesis or promote the expression of the transformed cell phenotype in breast tissues. Lipids in the intestinal also hinder the activity of natural killer cells which are responsible for removing of tumor cells. Since diet with animal products usually contain high amount of saturated fat, heavy meat consumption is also associate with higher incidence of intestinal cancer. Too much calories intake in the form of starch or various types of carbohydrates will increase the body rate of converting them into glycerol and eventually as fat reserve. In a recent research, women who ate meals less often had a reduced risk of colorectal cancer. Heterocyclic amines which are produced when protein is cooked over boiling point are potent mutagenic compounds. This may explain the meat association of higher cancer risk. Finally, nutritional deficiencies (in protein, antioxidant vitamins such as A, C and E) could decrease our capacity to resist infection and eradication of transformed or cancerous cells due to the down regulation of the immune system (Blackwood and Weber, 1996; Bruce and Corpet, 1996; DeVita, et al., 1997; Potter, 1996; Pruitt and Stein, 1994; Shoff, et al., 1997; Simone, 1992; Wong, et al., 1992c).

After the recent 20-50 years active research, scientific data are overwhelming on the cancer risk of tobacco smoking (Potter, 1996). Smokeless tobacco (such as snuff dipping), which contains high level of carcinogens called nitrosamines, is linked with oral cancer. In addition to lung cancer (which is the highest cancer killer among men and women), the use of tobacco is a lifestyle factor putting the users at an increased risks for cancer of the mouth, larynx, esophagus, kidney, bladder,

pancreas, stomach, colon and cervix. Smoke, which comes out of the cigarette, contains over 4,000 kinds of chemicals. Among these, about 400 of them are toxic to our body and at less about 43 of them are carcinogens (benzo[a]pyrene, benzene, styrene and ethylene oxide) . Tar (which contains several chemicals) is the most important lung cancer causing factor (initiator) in the cigarette smoke. Carbon monoxide and dioxide and other chemicals also increase the formation of free radicles in our cells which cause membrane damage and increase the risk of DNA mutation and thus cancer initiation. People who smoke 2 packs of cigarette per day increase their lung cancer risk up to 15-25% higher than non-smokers. Exposure to second-hand smoke also increase one's cancer risk. Evidence suggests that nonsmoking women married to smokers have 30% excess risk and the risks increase up to 70% among the most heavily exposed nonsmokers. Children who grew up in family with smoking parents are also at higher risk (Brugge, et al., 1991; Harvard Report, 1996; Pruitt and Stein, 1994; Risser, 1996).

Alcohol is a very strong topical cancer promotor. Its consumption is highly associated with liver cirrhosis and cancer. It is also a risk factor of various types of digestive tract cancer such as the mouth, esophagus, colon and rectum. Women, who drinks alcohol 3 times a week have increase their breast cancer risk up to 25% higher than those who do not drink any. For people who smoke and drink, the risks are multiplied 35-fold. (Brugge, et al., 1991; DeVita, e. al., 1997; Pruitt and Stein, 1994).

Ultra-violet B(UV-B) radiation from the sun is the most important risk factor for the different kinds of human skin cancer. UV-B is especially strong between 10:00 am and 4:00 pm on a sunny day. Even though most skin cancer types could be treated during early discovery, melanoma is a highly metastatic skin cancer. Avoiding over-exposure to the mid-day sun, usage of proper Vitamin E enriched sun block and wearing of T-shirt during long exposure would help to cut the risk. For early detection of skin cancer, UV-specific proto-oncogene p53 mutations in normal skin may be useful as biomaker (Ouhtit, 1997). Other important environmental radiation risk factor is radon. It is a radioactive isotope in the air which comes from various kind of earth/soil material. It is a decaying isotope from uranium. About 20% of lung cases can be traced to long-term radon exposure in work place or poor ventilated buildings and basements especially with exposed earth construction materials. Of course, over exposure to medical X-ray is very high cancer risk factor due to extensive ionization radiation which causes DNA mutation. Skin, breast , myelogenous leukemia, thyroid, and bone cancers are implicated. As mentioned before, indoor exposure of radon level of 4 pCi/liter has the same risk of developing lung cancer as a smoker who consumes half a pack of cigarettes per day. Long-term exposure to non-ionizing electromagnetic field, especially those generated by high voltage machines and cables, can inhibit melatonin formation in animals. Since melatonin regulates different functions of the immune system, long-term exposure to electromagnetic field in turns increases the risk of prostate and breast cancers. Human studies on the effects of electromagnetic field in relation to increased risk of leukemia, brain tumors and breast cancers are controversial . Recent studies suggest the possibility of the attraction of radon by electromagnetic fields which in turns increases the concentration of exposure of radon to workers or people who spend long time in such environment. Higher incidence of lung cancer is implicated in some cases (DeVita, et al., 1997; Gensler, et al., 1996; Simone, 1992).



Slide 22. Polycyclic aromatic hydrocarbons (PAHs), such as benzo[a]pyrene (BaP), is a major group of pollutants of the environment which implicates a higher cancer risk. These pollutants mainly come from the combustion of fossil fuel of and factories. These cause cancer of the skin and the lung, especially. Besides BaP, there are a number of cancer causing chemicals in the exhausted smoke of our vehicles. One such is nitrogen oxide. Sulphur oxides are also very dangerous in chemical smokes from factories. Water treatment by chlorine could be a pollution which increases the risk of urinary bladder cancers and gastrointestinal cancers. The process of water chlorination produces chemical compounds called trihalomethans (such as chloroform and bromohalomethane) which are the most common organic compounds found in drinking water (DeVita, et al., 1997; Pruitt and Stein, 1994; Simone, 1992; Talsaka, et al., 1996).

Occupational exposures are responsible for about 5% of all cancer deaths. People working in places where they have to be in contact with petrochemical such as in oil refining plant, gas stations and garages, or if they work in places which produce petroleum related products such as plastic are at higher lung cancer and digestive tract cancer risk. Workers of chemical and paint factories are also at a higher cancer risk. Truck and taxi drivers are also at higher risk of lung and bladder cancers. Preventive measures such as proper cleaning, protective clothing and tools should be used all the time to prevent over-exposure. In addition, fine dust from woods, textile and asbestos are also risk factors for lung cancers if worker are not in a habit of using protective mask during work (Brugge, et al., 1991; DeVita, et al., 1997).

Pesticides use is significantly associated with incidence of lung, prostate, liver, skin cancer and leukemia. Children born in farming area where extensive pesticides were used had significant leukemia incidence. Long-term use of insecticide contaminated fruits and vegetables is also a risk factor for getting digestive tract and bladder cancer. Xenoestrogens, including pesticides (such as DDT), dyes (such as food colorant Red Dye No.3), pollutants, plasticizers and food preservatives could mimic the effects of female estrogen (estradiol) by stimulating breast cancer cells to enter the

cell cycle which leads to cell proliferation and enhances the risk of carcinogenesis. Proper choice and washing of fruits and vegetables with running water would help to cut down the risk (Dees, et al., 1997; DeVita, et al., 1997).

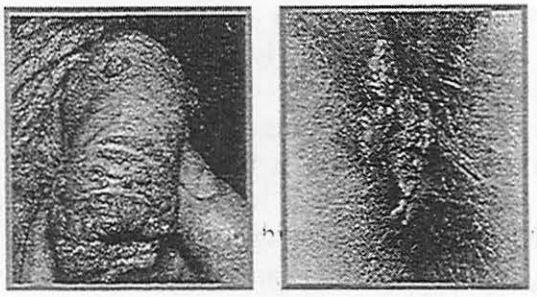
Long-term use of hormone treatment is associated with higher risk of breast and cervical cancers. Research findings shown that short-term use of hormone would not increase cancer risk. Hormon concentration in pills and patches are in microgram dosage which is too small to increase cancer risk in short-term use. But women with history of family cancer, especially that of the breast and the reproductive system, are at higher cancer risk if they use hormone treatment after menopause. The use of androgens for male is also implicated for liver cancer (Blackwood and Weber, 1996; DeVita., et al., 1997).

Different viral and bacterial infections are associated with various types of cancer risks. Hepatitis B virus (HBV) with AFB_1 together is associated with high incidence of liver cancer. Epstein Bar virus (EBV) has been implicated in Burkitt's lymphoma and nasopharyngeal cancer. Human Papilloma virus (HPV) is the caustive agent of genital warts which is highly contagious and is also associated with higher risk of cerival cancer. In a study HPV was found in over 90% of the cervical carcinomas. Herpes Simplex virus II (HSV2) causes herpes with is a highly contagious sexually transmitted disease and also related to higher risk of cancer of the reproductive organs. Besides these, Human T-cell Lymphotropic virus type I (HTLV-I) is implicated with adult T-cell leukemia and lymphoma. Of course, the Human Immunodeficiency virus (HIV) has been demonstrated to cause AIDS which predisposes to Kaposi's sarcoma and non-Hodgkin's lymphoma. Bacterial infection of the stomach, caused by *Helicobacter pylori*, increases the risk of gastric cancer significantly. Parasites, such as *Clonorchis sinensis* (liver fluke), increase the risk of liver cholangiocarcinoma, and *Schistosoma haematobium* (bladder fluke) enhances the chance of bladder squamous carcinoma (Brugge, et al., 1991; Kuipers and Meuwissen, 1996; Lorinxz, 1996; Pisani, et al., 1997).

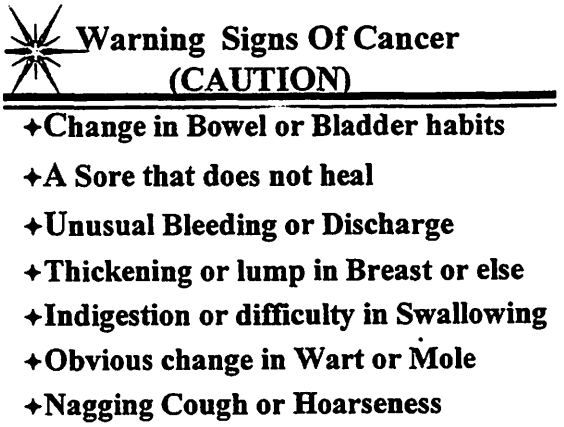
Physiological factors like long-term stress down regulate the immune system and suppress the action of natural killer cells. These cut down the DNA repair mechanism of our cells and weaken our defense mechanism against the promotion and progression of tumor cells. Obesity gives stress to the normal physiological functions of our tissues and systems. It also increases the chance of lipid peroxidation as well as interaction between estrogen horomone and fat tissue which enhance the risk of initiation process of cancer cells. Related higher risks are colon, endometrium and breast cancer (DeVita, et al., 1996; Pruitt and Stein, 1994; Simone, 1992).

Aging itself is a process similar to cancer formation. It is the result of the lack of ability of the body to repair its cell membrane and DNA damages due to the accumulation of attacks by free radicals and other exogenous and endogenous factors. Therefore, it is just a resultant phenomenon that cancer incidence is much higher among people over the age of fifty-five (Albert, et al., 1992; Brugge, et al., 1991).

Sexual: Teen, HSV2, HPV-Warts

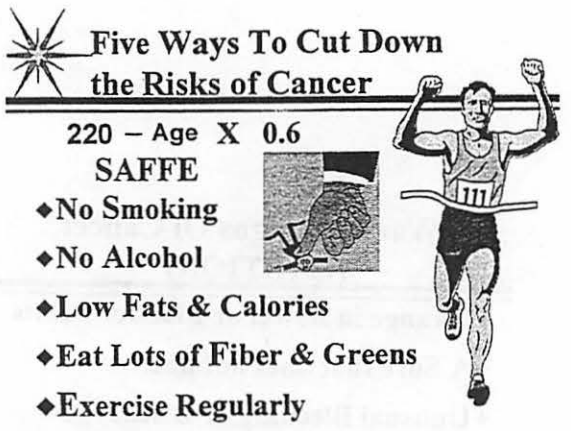


Slide 23. This slide shows genital warts growing on a male and female genitalia respectively (Wadler, 1990). Promiscuity and extra-martial sex without proper use of condom and hygiene increase the risk of the transmittion of viruses like HSV2, HPV and HIV which are associated with higher risk of cerical and genital cancers. Women who have early sexual experience during their teens have a higher risk of cervical and genital cancer. But that is also true for women, such as nuns, who never have sexual contacts. Wives of circumcised husbands have a significant lower incidence of cervical cancer compared to those married to non-circumcised men (DeVita, et al., 1997; Simone, 1992). Besides those cancer risk factors mentioned, medications and genetic susceptibility are also worth of our attention. Medication may account for about 1-2% of all cancers. The carcinogenic risk is associated with the use of estrogens, alkylating agents and immunosuppressive drugs. Future studies are warrant to elucidate a clear picture. In recent years, due to the identification of specific proto-oncogenes and tumor suppressor genes mutation and their implication in the origin of colorectal, breast and lung cancers, so called "cancer families" often display a single type of cancer or a variety of cancer types. For example, a woman, with mother or relatives who died of breast cancer, is at a higher risk of getting breast cancer. Very often, molecular analysis would also show the mutation of the Brca 1 or /and 2 gene mutation (Blackwood and Weber, 1996; Brugge, et al., 1991).



Slide 24. These are the seven major common warning signs of cancer. If you observe any one of them on yourself or others, consults a physician immediately for further check-up. Early detection and treatment is the key to longer survival from cancer or even prevention of it in some cause of benign and preneoplastic lesions as indicated in the recent declining cancer mortality in the United States (Cole and Rodu, 1996). The word CAUTION can be used to remind us these seven major warning signs (Pruitt and Stein, 1994).

Change in bowel movement (either too frequent after meal or long period of constipation) may be an implication of colorectal cancer development (Bruce and Corpet, 1996). Too frequent urination at night may be due to the enlargement of prostate gland or early stage of prostatic cancer in older male especially. If you have any open sore which does not heal completely for a relatively long period of time even after consistant application of medication, it is an indication of preneoplastic lesion or skin cancer. Frequent unusual bleeding or discharge especially in the genital area for female may be an early sign of cervical or endometrial cancer. Thickening or lump in the breast is an important sign of benign or malignant cancer especially for female about 35 years old. For male, testicular lumps may indicate the presence of cancer. Long-term indigestion or difficulty in swallowing may means obstruction of the alimentary canal due to tumor of the throat, esophagus or stomach. When you observe sudden changes (color or size) in the long time mole, watch out for melanoma. Cervical cancer is implicated if these changes happen in warts. Finally, nagging cough or hoarseness in breathing, not because you are having a cold, is a strong warning sign for cancers of the respiratory system (DeVita, et. al., 1997; Simone, 1992).



Slide 25. After learning about how cancer begins, possible reasons for different risks factors of cancer and warning signs of cancer, the following are the summary of five ways to help us to cut down the risks of cancer as suggested by ACS (1996). Recent Harvard Report on Cancer Prevention (1996) and Risser (1996) about smoking and causes of human cancer state that, the key to the prevention of lung cancer is to stop smoking.

The original recommendation from ACS on alcohol is moderate drinking. I here suggest a practice of total abstinence from alochol because there is always a risk of getting into the habit of frequent and heavy drinking when one begins to drink. As mentioned before, excessive alcohol comsumption is a riks factor for various types of cancers such as oral, pharynx, esophagus, head and neck, and liver cancer. It also works synergistically with smoking in the development of several gastrointerstinal cancers and urinary bladder cancer. In USA, older people, male, blacks and people on the low end of the socioenconomic scale have a greater frequency of these cancers. Malnutrition is also a problem of alcoholics. This can lead to the down-regulation of the immune system and enhance the growth of viruses which in turns increase of the risk of cancer. Besides, frequent use of alcohol contained mouth-wash is also a risk factor for oral cancer. Therefore, abstinence from alcohol use would decrease our risk of cancer (DeVita, et al., 1997; Simone, 1992).

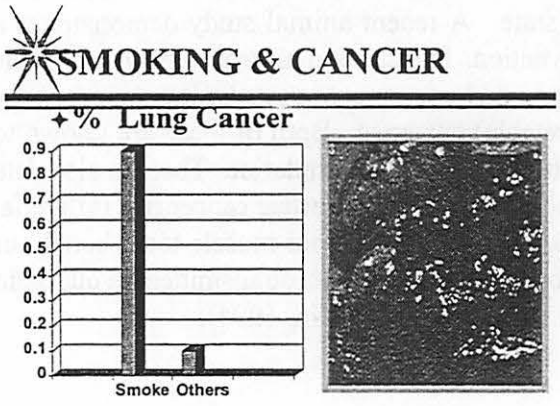
We can cut down fat by reducing the use of animal products and the heavy use of cheese and butter and saturated oil in cooking. We should cut down about 30% of fat and 20% of carbohydrates (especially refined one) from our regular diet. Cutting the frequency of eating or quitting the habit of snack eating between meal, late evening or night meal (especially heavy one) will stop the excess storage of lipids in our body which should help to lower cancer risk of the digestive tract and the breast (Shoff, et al., 1997; Simone, 1992)

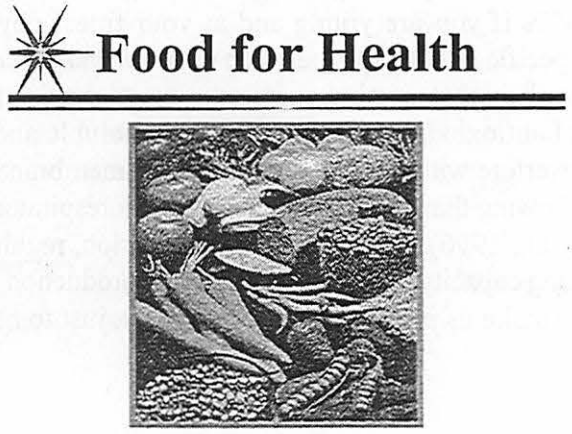
Fibers from fruits, vegetables and whole-grains are very important factors in cutting the risk of colorectal cancer (Slavin, et al., 1997). Fibers cut down the retention time of waste products of digestion in the intestine for harmful bacteria to act upon. These bacteria can produce carcinogens such as fecapentene and nitrosamines. Fibers also act as scavengers or sponge-like absorbant of those harmful chemicals before they attack the intestinal epithelium. Of course there are plenty of chemopreventive properties in green vegetables and fruits. Vitamin E, B-complex, and beta-carotene are implicated in stomach, lung cancer and oral leukoplakia prevention. Calcium and selenium in seeds and nuts are very helpful in lowering the risk of colon and breast cancer. High intake of vitamin C could also slow down the development of adenomatous polyps and cervial dysplasia (Simone, 1992). We will dicuss some of the specific cancer prevention plant chemicals (chemopreventive phytochemicals) later on.

Regular exercise (at least 4-5 times) a week will greatly enhance the normal functioning of all the organ systems and especially the immune system in the defense against cancer formation. One could easily begin by half-hour of morning or evening walk. Do the first 20 minutes in ease and do brisk walk for the last 10 minutes. If you want to do it more scientifically and reach the ideal cardiovascular function, you may use the following formula: (220-your present age)x 0.6. That means that you begin with 60% of your maxium heart beat rate and you just have to reach about 80% if you are young and at your fittest physical state. A recent animal study demonstrates a specific relationship between exercise and cancer prevention. Duncan and his team (1997) were able to show that running exercise may reduce risk for lung and liver cancer in rats by inducing activity of antioxidant and Phase II (water-soluble and excretable) enzymes. Both of these are known to interfere with the destruction of cell membrane and initiation of DNA mutation. There is also data showing that people with good cardiiorespiratory fitness have a lower prostate cancer risk (Oliveria, et al., 1996). Besides cancer prevention, regular exercise can enhance our muscle tone, better our lung capacity, blood circulation and production of good reward-circuit neurotransmitters in our brain to make us positive, happy and relax, just to name a few (Pruitt and Stein, 1994).

When You Smoke....

Slide 26. When you smoke, you look as stupid as this pig! Think about all those harmful and cancer substances you are inhaling and exhaling. Think about your family members and friends who are inhaling your second-hand smoke passively and forced to increase their cancer risk because of you! However, when you decide to stop smoking, it takes only 20 minutes to an hour to have your normal blood carbon dioxide, carbon monoxide, breathing rate and body temperate to go back to the normal range. After a month of quitting, your risk of getting any types of smoke-related cancer will be decreased to 50%. If you keep up the good habit of not smoking for 20 years, your risk of dying of lung cancer is nerly equal to that of someone who never smoke (Pruitt and Stein, 1994). Think twice before you try to smoke again!





Slide 27. Again we can see that people who smoke have a much higher incidence of lung emphysemia and cancer. About 80-90% of lung cancers can be traced to a smoking habit, and that lung cancer continues to be the number one cancer types among the others (Brugge, et al., 1991; Parker, et al., 1997; Risser, 1996).

Slide 28. These are the best food for the health of our bodies which our Creator instructed the first couple to enjoy as the best source of nutients for their perpect bodies in the Garden of Eden. These natural products of the earth not only contain all the essential nutrient for the proper functioning of our bodies, but cancer researchers now tell us that they also contain different important plant chemicals, which possess cancer prevention, called chemopreventive phytchemicals (Greenwald and Kelloff, 1996; Newmark, 1996; Riboli, et al., 1996). The next two slides are some of the major ones.

Chemopreventive Phytochemicals

- **Organosulfides: Garlic, Onions**
- **Isothiocyanates: Cabbage, Broccoli, Pak Choy**
- **Isoflavonoids: Soy Beans**

Slide 29. Organosulfides are rich in the onion family of vegetables especially garlic. These group of sulfur containing compounds possess chemopreventive properties which fight the initiation and growth of cancer (AICR, 1996). Water-extract of garlic (from about two small cloves) has been demonstrated to inhibit the growth of *Helicobactor pylori* which is one of causative agents of gastric cancer (Gowsala, et al., 1997).

Vegetables of the cabbage family (cruciferease) like broccoli, cauliflower, Brussels sprouts, Chinese white cabbage (Pak Choy) contain isothiocyanates such and indoles and other chemopreventive phenolic compounds which can interfere the action of carcinogens. Different isothiocynates were demonstrated to prevent cancer in various rat tissues such as mammary gland, lung esophagus, small intestine, colon, bladder, and liver. The mechanism of their chemopreventive activity is due to favorable modification of Phase I and Phase II carcinogen metablism which leads to the increased of carcinogen excretion or detoxification and decreased carcinogen DNA interaction. They were also shown to destroy estrogen (which is known to initiate new breast cancer cells especially). Some of these phytochemicals could also work as inhibitors of promotion (AICR, 1996; Newmark, 1996; Riboli, et al., 1996).

Phytoestrogens such as isoflavonoids in legumes especially soy beans have been shown to have cancer prevention properties. They demonstrated the ability to inhibit estrogen receptors, inhibit estrogen action and destroy cancer gene enzymes. Protease enzymes in soy products are also effective in the inhibition of the metastasis of cancer cells. Whole-grains also contain rich source of phytestrogen besides other different types of chemopreventive phytochemicals. Those chemicals are also effective in the prevention of a few types of chronic diseases. Although most research findings show the beneficial chemoprevention effects of phytoestrogens; however, it remains to be determined if dietary estrogens are beneficial because some *in vitro* studies showed that it may be an additional carcinogeic risk factor for tissues where proliferation is contrtolled by estrogens (AICR, 1996; Barnes, et al., 1996; Dees, et al., 1997; Potter and Steinmetz, 1996; Reinli and Block, 1996; Slavin, et al., 1997.)

5 - A - Day

- **Monoterpenes: Oranges, Lemons**
- **Polyphenols: Chinese Herbs, Green Tea**
- **Others: Cucumbers, Carrots, Pumpkins, Tomatoes**

Slide 30. Peel of citrus fruits like orange, grape-fruit and lemon contain anticarcinogenic monoterpenes such as limonene. An attractive theory for their cancer prevention is that they work as regulators of malignant cell proliferation by interact with the RAS oncogene signal transduction pathway. They are also shown to increase enzymes to break dow carcinogens and decrease cholesterol level in the blood. Yet the mechanism(s) which underlie their chemopreventive property is/are unknown. Vitamin C in these fruit juice are very effective antioxidant too. (AICR, 1996; Simone, 1992).

Japanese Green tea has been reported to contain chemopreventive polyphenols (mainly epicatechins) which inhibit tobacco-specific ntirosamine-induced lung tumorigenesis in mice and has demonstrated to have cancer chemopreventive effects in a broad spectrum of animal tumor model systems (Xu, et al., 1994). Chinese herbs such as *Oldenlandia diffusa* and *Scutellaria barbata* in the next slide have been suggested to contain chemopreventive polyphenols which make them effective in the inhibition of mutagenesis, DNA binding and metabolism of carcinogens AFB_1 and BaP *in vitro*. These two herbs also enhance the phagocytic activity of marcophages in vitro and significantly inhibit transplanted kidney tumor growth in mice (AICR, 1996; Wong, et al., 1992a, 1992b, 1992c, 1993a, 1993b, 1996). Some of the multifunctional activity of phenolics such as quercetin are: antioxidant (protecting membrane lipids), antimutagen (trapping electrphils like PAHs and heterocyclic amines), anti-protein kinases (inhibiting tyrosine and other kinases), and anti-nitrosation (inhibiting nitrosation of amines and amides). Even so, a recent evaluation of the epidemiologic literature of tea and cancer prevention recently suggest more human clinical trial data are warrant to confirm the positive chemopreventive properties of tea as shown in animal studues (Kohlmeir, et al., 1997).

There are many other beneficial chemopreventive phytochemical in our daily vegetarian diet; for example, plant sterols in cucumber skins are known to decrease cholesterol content; beta-carotene in carrots, yams, sweet potatoes, pumpkins and cantaloupe are very effective in enhancing the activity of Natural Killer Cells, neutralizing free radicals and singlet oxygen radicals, reversing pre-cancerous lesions; lycopenes in tomatoes could inhibit the growth of prostate cancer cells *in vitro*; quinones in rosemary were demonstrated to inhibit the actions of carcinogens and co-carcinogens; lignans in walnuts and flaxseeds were shown to be effective inhibitors of cancer risk hormones like estrogen and prostaglandins; polyacetylene in parsley had been demonstrated to inhibit prostaglandins and destroy BaP (AICR, 1996; DeVita, et al., 1997; Potter and Steinmetz, 1996; Santos, et al., 1996; Simone, 1992). Try to have five servings of the recommended fruits and vegetables in your daily diet from now on!

Chinese Medicinal Tea

✦*Oldenlandia diffusa* *Scutellaria barbata*

Functions:

- ◆**Cleans up chemicals which attack DNA to prevent Cancer initiation**
- ◆**Regulate P450 isozymes**
- ◆**Inhibits growth of Breast Cancer cells - MCF7**
- ◆**Reduces PMS discomfort & Menstrual Cramps - 2 drinks per day, 5 days before**

Slide 31. These are the two Chinese herbs which were mentioned before. They grow in the southern part of China including Hong Kong. I have found a related species of *Oldenlandia* in the campus of Caribbean Union College. Research is undergoing to investigate if it contains the similar chemopreventive properties.

Slide 32. Some of the laboratory demonstrated effects of these two herbs are shown in this slide. Besides their cancer prevention properties, recent unpublished data from 50 female volunteers of Caribbean Union College treated with these herbs undergone two menstrual cycle with significant reduced Premenstrual Sysdromes discomfort (emotional distress, irritation, bloatness, breast tenderness, etc.). The mechanism behind these surely deserves further study (Wong, et al., 1992a, 1992b, 1992c, 1993a, 1993b, 1996, unpulished data).

EATING IS FOR FLYING

He who will observe simplicity in all his habits, restricting the appetite and controlling the passions, may preserve his mental powers strong, active, and vigorous, quick to perceive everything which demands thought or action, keen to discriminate between the holy and the unholy, and ready to engage in every enterprise for the glory of God and the benefit of humanity.
Signs of the Times, 29-9-1881

Slide 33, 34. Why keep our body healthy and away from these cancer risks? The reason behind all these cancer prevention practice and good diet is to have a strong body and sound mind ready to do work to benefit others for the glory of God (White, 1881).

Our Body
Temple of the Holy Spirit

Do you realize that when you became a Christian, your body became a temple for the Holy Spirit ? His presence in you is a gift to you from God ! So you're no longer in charge of your body to do with it as you please. Your body belongs to the Lord Jesus Christ.

You've been bought with a price which no human can pay. Therefore, (no matter what you drink or eat) honor the One Who paid the price for you, because now you belong to Him.

1 Corinthians 6: 19,20

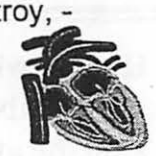
Slide 35, 36. The deeper reason and motivation for Christians to watch out for cancer and health in general is beautifully pointed out by the apostle Paul. It is because we belong to our Savior, Jesus Christ, who purchased us with His only possible and precious blood. He wants to live within us through the Holy Spirit.

The Gospel of Wholeness:
God's Saving Power

The **love** which Christ diffuses through the whole being is a vitalizing power. Every vital part- the brain, the heart, the nerves- it touches with healing. By it, the highest energies of the being are roused to activity.

Ministry of Healing, p.115

It frees the soul from guilt and sorrow, the anxiety and care that crush the life forces. With it come serenity and composure. It implants in the soul joy that nothing earthly can destroy, - joy in the Holy Spirit - **health giving, life-giving joy.**

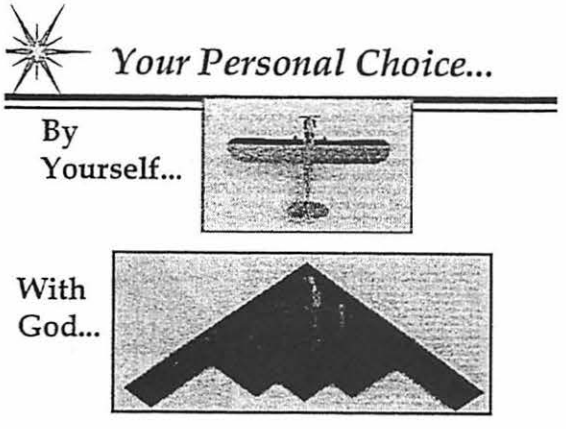


Slide 37, 38. Christ not only tells us why we need to keep healthy, He also promises to give us His love and to forgive our sin to bring us the joy of being forgiven. The same love is also capable of healing and encouraging us put into practicing what we have just learnt: to reach better health and the joy of seeing others enjoying the total health, and the gospel of wholeness through the saving power of Jesus Christ. Studies have also demonstrated the close-relationship between our positive state of mind or spiritual status and the activity of our immune system towards disease prevention and healing (Jensen, 1983; Gardner and Lyon, 1982a; 1982b;Gottlieb and Green, 1984; Larson and Milano, 1997; Solomon, 1996; White, 1942).

1 Thessalonians 5:23

**May the God of peace be with you
and help you to live for Him.
I pray that your whole being --
Body, Soul, and Spirit --
will be kept blameless by Him
until our Lord comes. Amen.**

Slide 39. After all, it is my hope and prayer that this presentation has make everyone more aware of the facts on the what, why, and how of cancer and cancer prevention. It is also my hope that God will take control of your life until He comes to receive you.



Slide 40. What is your personal choice and decision? Sometimes we think we are so intelligent and educated that we can fly in our own sky very ably like a small one engine plane. But please invite God to be with you now. God is more than able to work on what you already have and transform it into a much powerful stealth bumber which can even fly through your enemy Satan's heartland without being detected. Make your choice to accept and follow Him now!

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