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THE WORLD OF BREAST CANCER - A REVIEW

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ABSTRACT

Cancer is a generic term for a large group of diseases that can occur in any part of the body. It is caused by abnormal changes in the 'DNA' of the cell. Of all the types of cancers, 'Breast cancer' is most dangerous. It occurs mostly in women. Nearly 4,60,000 deaths per year are caused only by the breast cancer. Though there are many different types of cancer treatments like chemotherapy (chemotherapy medicines prevent cancer cells from growing and spreading by destroying the cells or stopping them from dividing.), surgery (removing the part of the breast which underwent the cancer.), hormonal therapy (hormonal therapy medicines treat the hormone receptor-positive breast cancers.) etc. but till now there is no successful method of treatment to cure the cancer completely. So always we need a new technology to treat the cancer. Thus nano technology, microwave technology, targeted therapy were introduced to detect and treat the cancer. Along with those technologies we can boost the immune system to fight against the cancer, drugs to silence the activity of 'hedgehog molecule' to prevent the metastasis of cancer and using 'blue berries' to prevent aggressive form of breast cancer. The research on mouse models that have contributed to our understanding of the molecular processes underlying breast cancer metastasis and how such experimentation can open new avenues to the development of innovative cancer therapy.

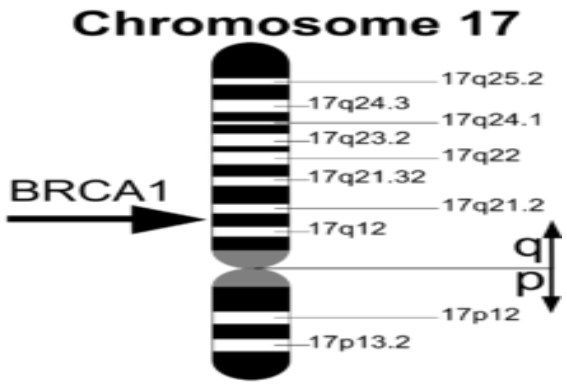
Keywords:- nano technology, blue berries, oncotype DX test, chemotherapy .

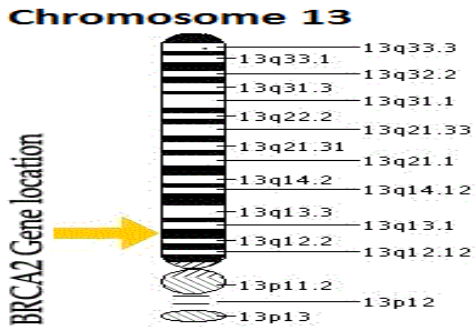
INTRODUCTION

Breast cancer (malignant breast neoplasm) is a type of cancer originating from breast tissue, most commonly from the inner lining of milk ducts or the lobules that supply the ducts with milk. Cancers originating from ducts are known as ductal carcinomas; those originating from lobules are known as lobular carcinomas. Breast cancer is a disease of humans and other mammals; while the overwhelming majority of cases in humans are women, men can sometimes also develop breast cancer. It is 100 times more common in women than in men. As many factors contribute to breast cancer such as age, ethnicity, estrogen exposure, abnormal conditions of breast, pregnancy and breast feeding, DES (diethylstilbestrol)exposure that is women who took the medication of DES which is useful to prevent miscarriage have a slightly increased risk of breast cancer[1,2], weight, diet, beginning of menstruation before 12years of age or stopping after 55years of age, life style factors, family history of breast cancer, alcohol intake, smoking, mutations in breast cancer genes. Among those factors alcohol and estrogen levels are main contributors for breast cancer. Mutations in breast cancer genes are responsible for hereditary breast cancer.

Hereditary Breast cancer: About 5% to 10% of breast cancers are thought to be hereditary, caused by abnormal genes passed from parent to child. Genes are particles in cells, contained in chromosomes, and made of DNA (deoxyribonucleic acid). DNA contains the instructions for building proteins. And proteins control the structure and function of all the cells that make up your body. Abnormalities in the DNA are like typographical errors. They may provide the wrong set of instructions, leading to faulty cell growth or function. In any one person, if there isan error in a gene, that same mistake will appear in all the cells that contain the same gene.

BRCA1 and BRCA2 genes: Most inherited cases of breast cancer are associated with two abnormal genes: BRCA1 (Breast Cancer gene one) which is present on chromosome 17, and BRCA2 (Breast Cancer gene two) which is present on chromosome 13. Everyone has BRCA1 and BRCA2 genes. The function of the BRCA genes is to repair cell damage and keep breast cells growing normally. But when these genes contain abnormalities or mutations that are passed from generation to generation, the genes don't function normally and breast cancer risk increases. Abnormal BRCA1 and BRCA2 genes may account for up to 10% of all breast cancers, or 1 out of every 10 cases. Having an abnormal BRCA1 or BRCA2 gene doesn't mean you will be diagnosed with breast cancer. Mutations in pieces of chromosomes called 'SNP's (single nucleotide polymorphisms) may be linked to higher breast cancer risk in women with an abnormal BRCA1 gene as well as women who didn't inherit an abnormal breast cancer gene. Women who are diagnosed with breast cancer and have an abnormal BRCA1 or BRCA2 gene often have a family history of breast cancer, ovarian cancer, and other cancers. Still, most people who develop breast cancer did not inherit an abnormal breast cancer gene and have no family history of the disease.





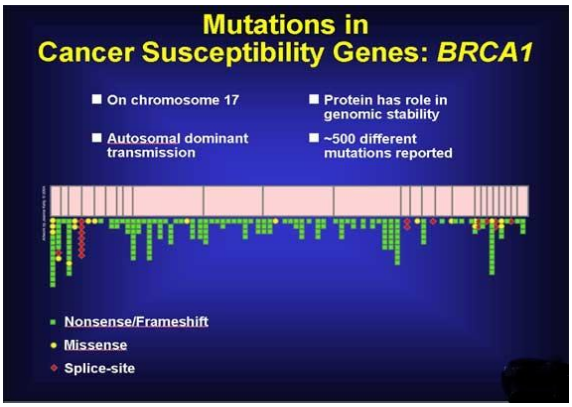
Breast cancer 1 gene
BREAST CANCER2 GENE

Mutations in BRCA1 & BRCA2 Genes

A **BRCA mutation** is a mutation in either of the genes *BRCA1* and *BRCA2*. Harmful mutations in these genes produce a hereditary breast-ovarian cancer syndrome in affected families. Mutations in*BRCA1* and *BRCA2* are uncommon, and breast cancer is relatively common, so these mutations consequently account for only five to ten percent of all breast cancer cases in women. *BRCA*-related breast cancer appears at an earlier age than average. It has been asserted that BRCA related breast cancer is more aggressive than normal breast cancer. *BRCA1* is associated with triple-negative breast cancer, which does not respond the hormones and cannot be usefully treated with some drugs, such as Herceptin. Breast cancer often appears about two decades earlier than normal[3]. *BRCA2* is associated primarily with post-menopausal breast cancer, although the risk of pre-menopausal breast cancer is significant. Like most non-hereditary breast cancers, it is typically responsive to hormones[3].

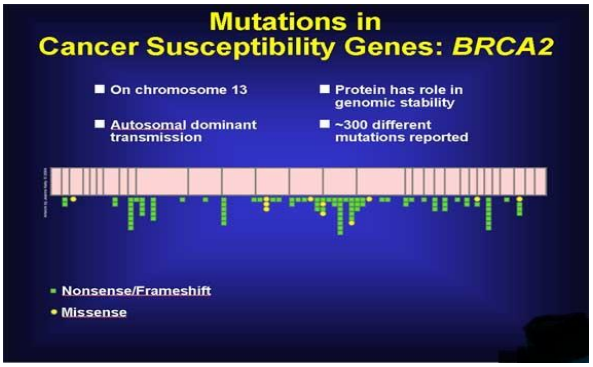
BRCA1 Breast cancer susceptibility gene[4]

Individuals who inherit these cancer-predisposing germline mutations carry their mutated alleles in every cell in their bodies which leads to cancer.



BRCA2 Breast cancer susceptibility gene[4]

Inheriting these mutated alleles greatly increases a person's lifetime risk for developing cancer. This may explain why cancers linked to germline mutations in susceptibility genes often occur at an earlier age and in multiple sites.



Breast cancer by 'Alcohol intake'

Alcohol is known to be carcinogenic to humans in female breast. Alcohol (specifically 'ethanol') is carcinogenic to humans at several sites in the body."

When alcohol is metabolized in the human body, it is converted to "acetaldehyde"(by oxidation), a chemical that is structurally similar to formaldehyde. Acetaldehyde can cause DNA damage, trigger chromosomal abnormalities in cell and act as carcinogen and causes breast & liver cancer. In most people, acetaldehyde is quickly converted to 'acetate', a relatively harmless substance, by an enzyme called 'aldehyde dehydrogenase 2' (ALDH2). Some people are unable to metabolize alcohol to acetate due to a genetic variant in the "ALDH2 gene".[5] However, when the DNA is damaged, replication cannot continue. "The Fanconi anemia-breast cancer (FA-BRCA)" network is a collection of proteins that responds to DNA damage by coordinating DNA repair or helping the replication machinery to bypass the DNA damage, thereby allowing replication to continue. In the human body, the "FA-BRCA" network seems to be particularly important in protecting against breast cancer."

Breast cancer by 'Estrogen exposure'

Estrogen is a hormone that is necessary for the normal development and growth of the breasts and organs important for childbearing. It helps control a woman's menstrual cycles and is essential for reproduction. Estrogen also helps maintain the heart and healthy bones. However, a woman's risk for breast cancer is associated with lifetime exposure to estrogen. The hormone estrogen works as a chemical messenger in the body. It is essential for normal sexual development and functioning of female organs important for childbearing like the ovaries and uterus. Estrogen also helps regulate a woman's menstrual cycles. It is necessary for the normal development of the breast[6].

Estrogen may be implicated in breast cancer risk because of:

1. its role in stimulating breast cell division,
2. its work during the critical periods of breast growth and development,
3. its effect on other hormones that stimulate breast cell division, and
4. its support of the growth of estrogen responsive tumors.

Women with a high lifetime exposure to estrogen may be at higher risk for breast cancer, so it is important to know how lifestyle factors may affect the levels of estrogen in body.

Diet: The foods that women eat can affect levels of estrogen in their bodies. Diets that are very low in fat, and high in fiber may decrease the levels of estrogen in the body. Certain dietary factors may increase breast cancer risk directly by increasing levels of estrogen in the blood, and indirectly by affecting obesity. Obesity is thought to increase the risk of postmenopausal breast cancer.

Dietary phytoestrogens: Phytoestrogens are plant estrogens found in foods like soybeans, tofu, whole grains, fruits and vegetables, and certain spices and herbs. A diet rich in phytoestrogens has been proposed as a way to decrease breast cancer risk. This is because most phytoestrogens are not stored in the body, but are quickly broken down. Phytoestrogens are weak estrogens, and may prevent stronger human estrogens from binding to the estrogen receptor in breast cells. If the weaker estrogens bind to the receptors instead of the stronger ones, there may be less breast cell division. Women with diets rich in phytoestrogens also excrete more estrogens into their urine, and have lower blood estrogen levels. Women with a diet rich in phytoestrogens have longer and hence fewer, menstrual cycles. All of these factors may contribute to reduced breast cancer risk.

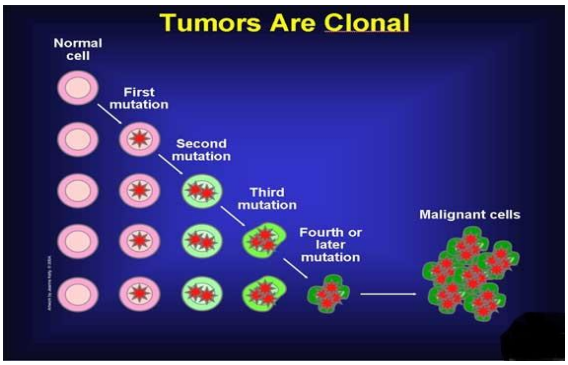
Alcohol: Drinking alcohol may increase breast cancer risk, and the increased risk is tied to the amount of alcohol consumed. One proposed explanation for the relationship between alcohol and breast cancer is that alcohol consumption may increase the amount of circulating estrogen in the bodies of women who drink.

Birth control pills: There is considerable debate over whether the use of birth control pills may affect breast cancer risk. This may depend on the level of estrogen present in the birth control pill, the length of

use, and the time in a woman's life when the pills were used. For instance, the first birth control pills that were available to women in the 1960s had much higher levels of estrogen compared to those currently on the market. Women who use birth control pills have a increased risk of breast cancer and this increased risk persisted in the 10 years after the use of the pills was stopped. Mostly the breast cancer is diagnosed in women who had used birth control pills tended to be less advanced than in women who had never taken birth control pills. By the above risk factors DNA in the cells of breast undergo abnormal functioning which leads to uncontrolled cell division. This results in the formation of tumor in the breast. Tumors in the tissues are formed in the following way.

Tumors are clonal

Each cell, when it divides, generates two identical new ones. So, when a cell acquires a mutation, it passes that mutation on to its progeny during cell growth and division. Because cells with cancer-linked mutations tend to proliferate more than normal cells, cellular candidates for additional mutations grow in number. Mutations continue to accumulate and are copied to descendant cells. If one cell finally acquires enough mutations to become cancerous, subsequent cancer cells will be derived from that one single transformed cell. So all tumors are clonal, which means that they originate from a single parent cell, whether that first mutant cell was of germline or somatic origin.



Immune system response to 'Tumor cells'

Breast cancer cells start out as normal body cells, but they begin to grow out of control because of an abnormal gene. The immune system plays a major role in limiting the development of these abnormalities, often before cancer has a chance to grow. This gets rid of many cancerous cells before they can do any harm. Damaged, pre-cancerous cells may be a constant presence, but an ever-alert immune system takes them out and protects us from many assaults of cancer that never get beyond the very earliest stage.

Immune system fails

Occasionally, though, even though cells are changing from normal to abnormal, they may still appear to be normal. Their outer appearance (proteins and other molecules on their surface) may look unchanged, even though profound changes may be happening in the inside. In this way, these abnormal cells manage to escape attack by the immune system and grow and multiply without triggering an immune response. This is how it's possible for a tumor to form, even when your immune system is working normally. Eventually, however, the tumor becomes so altered and threatening that it can no longer hide its malignant character. The immune system is no longer fooled in recognizing these cells as normal, and launches its attack.

The attack may succeed, or it may come too late, the tumor may be beyond the power of the immune system by itself. The immune system need help to fight against cancer, that is

Immune growth factors - medicines that stimulate the production of new immune cells;

Antibody medications- special antibodies made in laboratory, designed to target a specific antigen on a cancer cell;

Vaccines - Agents that stimulate the immune system to fight back, giving it a wake-up call to action.

Every cancer is different

Cells are the building blocks of every living thing from tomatoes to ladybugs to salmon to people. The instructions that tell a cell what to do are in genes within the center of the cell. Those genes are made of DNA (deoxyribonucleic acid). DNA can change or be damaged overtime. Some DNA changes are harmless, but others can cause disease. Cancer cells are "born" when abnormal changes in DNA tell cells to grow faster and behave differently than they should. As these cancer cells multiply to form a tumor, they continue to change, becoming more and more different from each other. As a cancer grows, new and different types of breast cancer cells are created within that same cancer. The mixture of cells that builds up over time becomes more and more complex. So even though every cell of a cancer is related to the same original "parent" cell, all the cells that make up a cancer are not the same. The idea that different kinds of cells make up one cancer is called "tumor heterogeneity". By the time a breast cancer

tumor is one centimeter (less than half an inch), the millions of cells that make up the lump are very different from each other. And each cancer has its own genetic identity, or fingerprint, created by the DNA in its cells. So two people with breast cancer who are the same age, height, weight, and ethnicity, and who have similar medical histories, almost surely have two very different cancers. The only thing the cancers have in common is that they started from a breast tissue cell.

Treatment for Breast cancer

There are so many different types of treatments for breast cancer. Because the cancer cells can be so different, what kills one type of cell might not do anything to another. The best overall treatment involves getting the best out of each specialty. Surgery, radiation, chemotherapy and hormonal therapies all work in different ways on their own and they can be extra effective when given together. More than one hundred medications have been approved to treat cancer, and many more are being developed. Some treatments are very specialized, designed to target only a particular gene or protein in the cancer cells. This targeted therapy might do its job well, but that's only one part of the overall fight against the cancer. Other treatments are needed to fight other target s in the cancer cells. Each treatment does its part to get rid of the whole cancer. This is why some treatments work best in combination with other treatments or before or after other therapies. The differences in cancer cells are why two people with breast cancer may have completely different treatment plans.

'Hormonal therapy' targets hormonal receptors that lead to cell growth. **'Chemotherapy'** prevents cancer cells from growing and spreading by destroying the cells or stopping them from dividing. **'Surgery'** involves in removing the part of the breast which underwent the cancer (lumpectomy) or removing the whole breast (mastectomy). As many disadvantages are there by these treatments, the use of these treatments is limited. The main disadvantages by these treatments are

Disadvantages of Chemotherapy

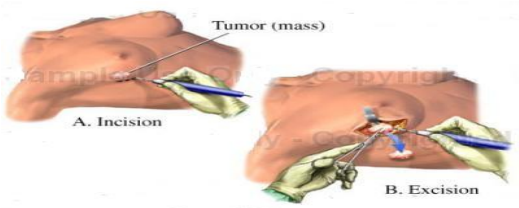
Chemotherapy is the treatment that is performed that involves numerous agents such as docetaxel, vinorelbine, mitoxantrone and estramustine. These agents deactivate the cancer cells production. The chief disadvantage of chemotherapy is that the drugs cannot classify between quick-growing and slow-growing cancer cells. Drugs used during chemotherapy have the power to kill all types of cells in the process of the cancer treatment. This chemotherapy treatment augments destruction of good cells too and therefore, paces the way for damaging the hair follicles resulting in huge amount of hair loss. This is one of the great disadvantages of chemotherapy treatment. Since chemotherapy cannot classify between healthy cells and cancer cells (as both are developing), side effects are predictable For example, healthy dividing cells can include cells of reproductive system, hair follicles, gastrointestinal tract and bone marrow. The side effects can be provisional or long-term. Temporary side effects range from nerve damage to hair loss.

Disadvantages by Surgery

There are 2 types of surgeries for the treatment of Breast cancer. Those are

1. Lumpectomy.
2. Mastectomy.

LUMPECTOMY- It involves the removal of only a part at which the tumor was formed. It can preserve much of the appearance and sensation of your breast.

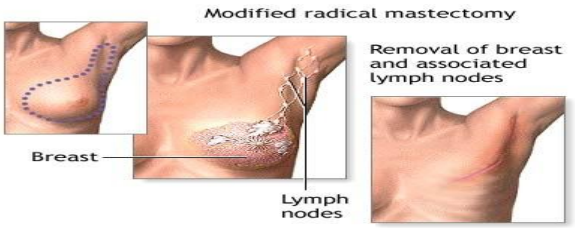


REMOVING TUMOR FROM BREAST

The disadvantages are,

- You are likely to have 5 to 7 weeks of radiation therapy, 5 days per week, after lumpectomy surgery to make sure the cancer is gone.
- Radiation therapy may affect the timing of reconstruction and possibly your reconstruction options after surgery. Radiation therapy also may affect your options for later surgery to lift or balance your breasts.
- There is a somewhat higher risk of developing a local recurrence of the cancer after lumpectomy than after mastectomy.
- The breast cannot safely tolerate additional radiation if there is a recurrence in the same breast after lumpectomy. This is true for either a recurrence of the same cancer, or for a new cancer.

MASTECTOMY: For some women, removing the entire breast provides greater peace of mind. Radiation therapy may still be needed, depending on the results of the pathology.



REMOVING OF TOTAL BREAST

Mastectomy has some possible disadvantages:

- Mastectomy takes longer and is more extensive than lumpectomy, with more post-surgery side effects and a longer recuperation time.
- Mastectomy means a permanent loss of your breast.
- You are likely to have additional surgeries to reconstruct your breast after mastectomy.

Tumor resistance against treatment

Over time, it is possible for a tumor to develop resistance to treatment. This is when cancer cells figure out how to survive against treatments. This might happen when various treatments kill the cells they know how to kill but don't work against every last cancer cell. The cells that escaped the killing-effects of earlier treatment are called resistant cells. They survive the prior treatment attack and eventually grow. This is how recurrence can happen. To get rid of these resistant cancer cells, we need new forms of treatment that work differently from treatments we had before. Sometimes a second round of treatments might be able to get rid of all the left over cancer cells. But in other situations, additional rounds are needed.

To overcome the disabilities of these treatments new treatments are invented using nano technology, microwave technology, using blue berries for the treatment of cancer.

Using Nano technology in cancer treatment

By using nano technology we can know the process by which new tissues and blood vessels are forming in the cancerous tumors. Cancer cells develop in harmful ways because they do not detect signals in the same fashion as do healthy cells.[7]

Directing communication between cells

What a cell develops into is determined by signals it receives from its immediate surroundings and other cells nearby which are tumors. The communication is altered by placing a nano structured biomaterial that has been surface treated with specific molecules known to give off certain signals to the cells. By reproducing the signals that cell encounter from their immediate surroundings inside the body's various tissues, we can control how the cells proliferate and differentiate to form a tumor.

With ‘tissue engineering’, we can reproduce a tumor in order to study how it interacts with blood vessels. If we can cut the blood supply to the tumor, it will starve and die. Tumor tissue engineering can also help in determining how cancer cells spread via blood circulation. A new gene has been discovered that regulates the spread of breast cancer by this technology.

NANO MATERIAL ON ‘DNA’ STRAND

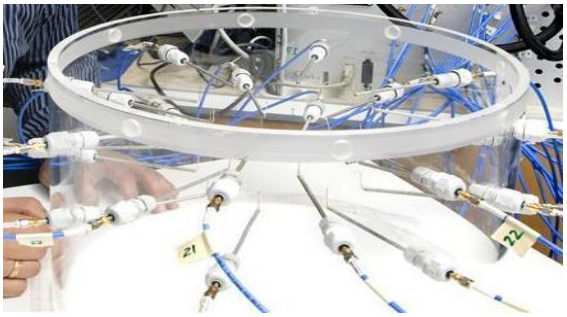
Using Microwave technology in Breast cancer treatment

Treatment with the aid of microwaves, which could play a pioneering role in the battle against cancer is very effective. These techniques could save many lives and are more effective, less invasive and simpler than currently available alternatives. Using X- rays to detect breast cancer. The other aims to treat tumors in the head and neck by heating the cancer cells. Microwaves can be used to create medical images, a new technique known as ‘microwave tomography’.

The method has several advantages over mammography. "We obtain three- dimensional images showing significantly better contrast between healthy and malignant tissue compared to X- rays. That makes it easier to detect even really small tumors that may currently be obscured by healthy tissue, thus creating the preconditions for much more reliable diagnosis.""Unlike X- rays, the technique

also emits negligible doses of non-ionising radiation less than a hundredth of the radiation to which we are exposed when talking on a mobile phone."

Using the technique in conjunction with a treatment couch, equipped with holes for the breasts, to which the thirty or so antennas required by the examination are connected. It should be considerably more comfortable for patients than mammography. The method is also much less expensive, not only because microwave equipment is not so costly, but also because the clearer images make interpretation easier for the doctors. The microwaves are actually used to destroy the tumors by heating them, a process known as 'hyperthermia'[8]. Treatment with conventional radiotherapy and chemotherapy in combination with hyperthermia may double the long- term ability to cure certain forms of cancer, such as cervical cancer and breast cancer. A new hyperthermia system that can reach deep- seated tumors in the head and neck with high accuracy. In this way, higher temperatures can be reached in the tumor without affecting the surrounding tissue. As soon as a tumor is detected, the already connected antennas could be used to start treating the tumor directly while at the same time monitoring that the right tissue is heated up. The method should also be applicable for not only breast but also useful for head and neck.



Microwave tomograph

Using 'Blue berries' for treatment

Blue berries could prevent the aggressive form of cancer. For women one fruit could be a delicious weapon in the battle against the breast cancer. Phytochemicals which are present in blue berries could prevent the spread of triple-negative breast cancers, which are typically can't treated be targeted by other targeted therapies. The blue berry extracts when applied to the cancer cells, they stop the spread and growth of malignant tumor[9]. About two cups of blue berries per each day showed the positive effect on mice which underwent breast cancer. The combination of all the different phytochemicals in blue berries working together that aid in increasing its activity.

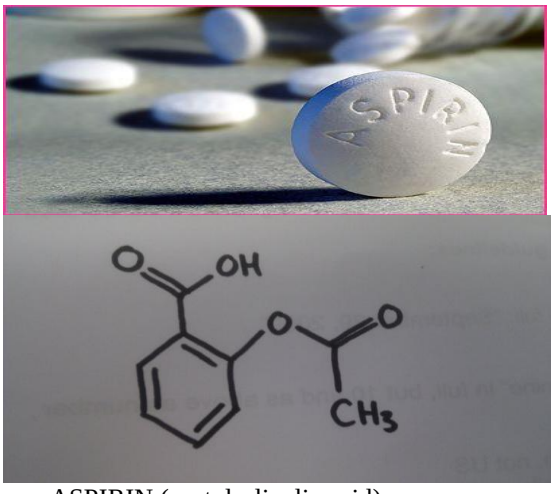
BLUE BERRIES

Daily use of 'Aspirin'

'Aspirin' appears to substantially reduce breast cancer survivor's risk of metastasis and death. An aspirin at least two days a week significantly reduced breast cancer death risk by 64% to 71%. The risk reduction for distant metastasis in breast cancer survivors taking aspirin at least two days a week was a significant 43% to 60%[10].

Aspirin and other non-steroidal anti-inflammatory drugs (NSAIDs) non-selectively block 'Cox-2' overexpression, which has been linked to metastasis of breast cancer, and also lower serum estradiol. The anti-inflammatory effect of aspirin might itself hold benefits against cancer.

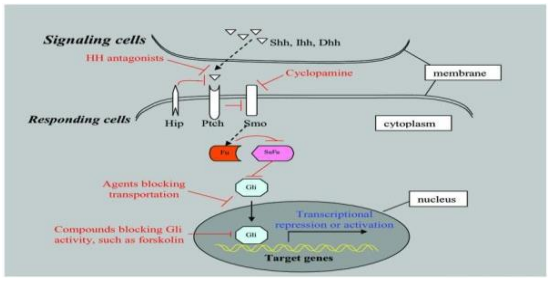
However the aspirin isn't risk-free. It can cause 'GI bleeding'. Aspirin use assessments in the first year after diagnosis was excluded since the drug is discouraged during chemotherapy. Among these women who survived for more than a year after diagnosis, those who used aspirin more were less likely to subsequently die from breast cancer. However the use of aspirin may fight against the breast cancer.



ASPIRIN (acetylsalicylic acid)

Silencing the activity of 'Hedgehog molecule'

Breast cancer cells create the conditions for their own survival by communicating their needs to the healthy cells that surround them, molecule known as 'hedgehog' sits at the centre of the switchboard in breast cancer, transmitting biochemical signals between the cancer cells and healthy cells. When this conversation is blocked or hedgehog is 'silenced', tumors shrink and stop their spread. This is particularly relevant for women with 'basal breast cancer', for which there is no current targeted therapy. The higher the level of hedgehog represents the more aggressive form of the cancer. High levels of hedgehog in some breast cancer patients can produce a protein which helps the tumor to grow. Mice developed tumors that grew and spread through the body rapidly after affecting to the carcinogenic agent. When hedgehog was blocked, the tumor growth and spread were significantly slowed.



Mechanism Of Hedgehog signaling

Ligands, such as Sonic Hedgehog (Shh), Indian Hedgehog (Ihh), and Desert Hedgehog (Dhh), are secreted by signaling cells and bind the transmembrane receptor patched (Ptch) in HH responding cells. In the absence of ligands, Ptch binds to Smoothened (Smo) and blocks Smo's function, whereas this inhibition is relieved in the presence of ligands, and Smo initiates a signaling cascade that results in the release of transcription factors Glis from cytoplasmic proteins fused (Fu) and suppressor of fused (SuFu) [11]. In the inactive situation, SuFu prevents Glis from translocating to the nucleus; in the active situation, Fu inhibits SuFu and Glis are released. Gli proteins translocate into the nucleus and control target gene transcription.

Boosting the Immune system to fight against cancer

Nearly every woman diagnosed with breast cancer feels conflicted about accepting treatment that knocks down her immune system. Build up the immune system to combat the cancer and to restore overall health.

Complementary approaches

Nutrition, stress reduction, exercise are the main complementary approaches.

Nutrition: Anything our body does is crippled by poor nutrition. This is true for healing a wound, building immune cell blood counts, and even managing stress. Attention to good nutrition makes sense whether it specifically benefits the immune system or not. Nutrition is a mean of reducing cancer risk and cancer death and increasing the quality of life. Use of combination of vegetarian diets and fat restriction, coupled with stress reduction and other complementary medicine therapies can strengthen the immune system to fight against the cancer.

Supplements vs. food: Vitamins and other important nutrients are best eaten in whole foods rather than swallowed as processed supplements. Whole foods may contain many other valuable components that we currently know little about. Fresh fruit s and vegetables, SURE grains, mushrooms, herbs, teas, omega-3 fatty acids (found in freshwater fish like salmon and mackerel), complex carbohydrates, yogurt, and seaweed are believed to increase the activity of T cells and their escort cells, and to increase the production of antibodies and fighting cells.

Exercise: Moderate exercise affects the immune system positively in cancer patients. In the midst of treatment moderate exercise that is three or four times a week increased the immune cell count in women undergoing breast cancer treatment back to normal levels and also improves the women's ability mood and ability to handle their feelings comfortably.

Stress reduction: High levels of stress hormones (like adrenaline) suppress the immune system and reduce the body's ability to defend or repair itself. That's why treatment of stress reduction therapy along with chemotherapy, radiation may reduce the adverse effects of cancer. Meditation, visualization, yoga, and other relaxation techniques may help bolster the immune system and assist in fighting the effect s of the cancer.

Determination of recurrence of Breast cancer

Because not all women benefit from chemotherapy equally, the 'Oncotype DX' assay is a 21-gene assay that provides an individualized prediction of chemotherapy benefit and 10 years distant recurrence to inform adjuvant treatment

decisions in certain women with early stage invasive breast cancer.

This test is suitable for women who are diagnosed with 'estrogen-receptor-positive (ER+), lymph-node-negative' type of breast cancer. This means that the cancer's growth is fueled by the hormone estrogen, and it can be treated with hormonal therapies that block or lower estrogen. It also means that the cancer has not spread from the original tumor site to the lymph nodes. Negative lymph nodes are a good sign: if there is no evidence of cancer cells in the lymph nodes, then the cancer most likely is limited to the breast.

The Oncotype DX test may be able to help in determining whether or not the cancer is:

- likely to recur
- likely to benefit from chemotherapy

Oncotype DX is known as a 'genomic assay', it looks at groups of genes and how active they are, which can influence how a cancer is likely to grow and respond to treatment. A genomic test is different from a genetic test. A genetic test looks for mutations (unusual changes) in genes that are inherited, or passed from one generation to the next. The Oncotype DX test uses a sample of breast tumor tissue to analyze the activity of 21 different genes. Genes control the behavior and activities of all cells, including cancer cells. When cells are behaving abnormally, this can often be traced back to unusual activity by certain genes. Looking at this set of 21 genes can provide specific information on: the likelihood that the breast cancer will return, whether you are likely to benefit from commonly used chemotherapy regimens. So, Oncotype DX is both a 'prognostic test', since it provides more information about how likely (or unlikely) the breast cancer is to come back, and a 'predictive test', since it predicts the likelihood of benefit from chemotherapy treatment.

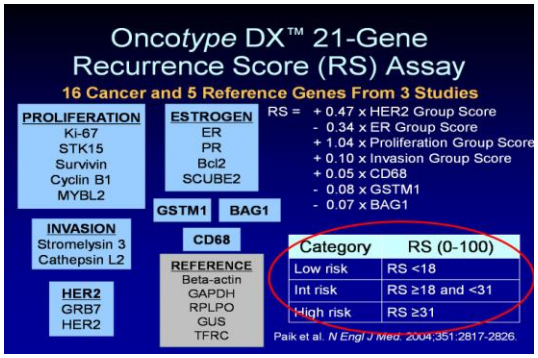
Interpreting the results

When the Oncotype DX test is complete, reports will shows the recurrence possibility of breast cancer after the treatment as follows

- **Recurrence Score lower than 18:** This suggests you have a low risk of recurrence. The benefit of chemotherapy is likely to be small and will not outweigh the risks of side effects.

- **Recurrence Score between 18 and 31:** This score suggests you have an "intermediate" risk of recurrence. It's unclear whether the benefits of chemotherapy outweigh the risks of side effects.

- **Recurrence Score greater than 31:** This suggests the high risk of recurrence, and the benefits of chemotherapy are likely to be greater than the risks of side effects.



CONCLUSION

Elucidation of the mechanism of DNA damage by various lifestyle factors such as alcohol intake, diet, smoking, exposure to various environmental factors the breast cancer risk may be reduced by limiting them. After affecting to the breast cancer immune system weakens, inducing the immune system to fight against the breast cancer by using immune growth factors, vaccines, and antibody medications. After knowing the stage of breast cancer properly then only treatment is given by traditional methods such as chemotherapy, surgery, radiation therapy. The researches on mice using nano technology, microwave technology resulting in the new treatment methods to treat the cancer without effecting the surrounding parts of the tumor. Silencing the activity of hedgehog molecule by using certain types of drugs that prevent the metastasis of cancer, using this technique we can limit the tumor formation to one part of the breast and it cannot spread to other parts of the body. Using 'aspirin' without causing any side effects is an excellent way to fight against the breast cancer. After the treatment the precautions should be taken to prevent the recurrence of the breast cancer by using 'Oncotype DX genomic assay'.

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