Microwave Gun

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I. INTRODUCTION

MICROWAVE: -

Microwaves are a form of electromagnetic radiations which are having wavelength from one meter to one millimeter. Microwave have the frequencies between **300 MHz** (100 cm) and **300 GHz** (0.1 cm). The frequency range of the microwaves are different. The different frequency range of microwave are defined by the different sources of the microwaves. This definition also includes both **UHF** (Ultra High Frequency) and **EHF** (Extremely High Frequency) having millimeter wavelength wave bands. The definition of microwave according to the radio engineering is the range of microwaves should be between **1** and **100 GHz** (**300mm** and **3 mm**). Frequencies in the microwave range are often referred by the IEEE radar band designations which are **S, C, X, K_u, K,** or **K_a**band, or by similar NATO or EU designations.

Microwaves travel by line of sight not like lower frequency radio waves. The microwave frequency can be reflected by the metal surfaces. They heat materials if they can make atoms or molecules in the material vibrate. The amount of heating depends on the intensity of the microwave radiations and the time that the material is exposed to the radiation. The microwaves can pass through the glass and plastics. The microwave can pass through the ionosphere without being reflected. Microwaves are extremely widely used in modern technology. They are used for point-to-point communication links, wireless networks, microwave radio relay networks, radar, satellite and spacecraft communication, medical diathermy and cancer treatment, remote sensing, radio astronomy, particle accelerators, spectroscopy, industrial hating, collision avoidance systems, garage door openers and keyless entry systems, and for cooking food in microwave ovens.

MICROWAVE GUN:-

Microwaves can be used to create medical images. A new technique which can be used to treat tumours in the head and neck b heating the cancer cells. This new technique is known as microwave tomography. Microwaves are actually used to destroy the tumours by heating them, aprocess known as hyperthermia. Hyperthermia is a cancer treatment that involves heating tumour cells within the body. by increasing the temperature of tumour cells, it results in cell membrane damage, which in turn, leads to the destruction of cancer cells. Today hyperthermia is used as an adjunct to radiation therapy and chemotherapy. Hyperthermia treatment of cancer requires directing a carefully controlled dose of heat to the cancer tumour and surrounding body tissues. The cancer tissues can be destroyed at exposure to a temperature of about **108 ^{o}F**for an hour. This high heat must be used wisely because too little heat and the cancer will not be killed. However, if too much heat misses the tumour target, the skin or any other healthy tissues could be burned. Microwave energy is very effective in heating cancerous tumours, because tumours typically have the high water content.

II. LITERATURE REVIEW

[1] Cancer: It is a group of diseases which involves abnormal growth of cells having capability to do invasion or spreading to rest of the body parts. This dissimilitude with beingtumors, which don't spread to rest of the body parts. The Possible signs and symptomswhich can be seen is a lump, unusual bleeding, long duration cough, weight loss, and a change in movements of bowel. Although these symptoms may indicate cancer, they may have other causes. More than 100 types of cancers affect humans.

[2] Curing Techniques

Many treatment options for cancer are available. The primary ones which are famous and most widely in use are surgery, chemotherapy, radiation therapy, hormonal therapy, targeted therapy and palliative care. The treatment which is being used depends on the type its location and grade of the cancer as well as the patient's health and preferences. The treatment may or may not be curable.

[2.1] Chemotherapy:

Chemotherapy is the process of treating cancer with more than one cytotoxic anti-neoplastic drugs which is a chemotherapeutic agent and it is a part of a standardized rule. The term produces a variety of drugs, which are being divided into broad categories such as alkylating agents and furthermore antimeta bolites. Standard chemotherapeutic agents do work by killing cells that divides very fast, a crucial property of most cancer cells.

Target concentrating therapy is another form of chemotherapy that makes it target specific to molecular differences between the cancer and the normal cells. The earlier therapies blocked the oestrogen receptor molecule, which inhibits the growth of breast cancer. Other example is the class of Bcr-Abl inhibitors, these are used to treat chronic xylogenous leukaemia (CML). Currently, targeted therapies exist for breast cancer, multiple myeloma, lymphoma, prostate cancer, melanoma and some other cancers.

The ability to produce an intended result of chemotherapy depends on the type of cancer and its stage. In collaboration with surgery, chemotherapy has proved to be useful in many cancer types which includes breast cancer, colorectal cancer, pancreatic cancer, osteogenic sarcoma, and certain lung cancers. Chemotherapy can be curative for some cancers, such as some leukaemia and ineffective in some brain tumors and needless in many others, such as many non-melanoma skin cancers. The ability of effecting of chemotherapy is sometimes limited by its nature of toxic to other tissues in the body. Even sometimes when chemotherapy not provide a permanent cure, it can be useful to slow downmany symptoms such as pain or to reduce the size of an inoperable tumor in the hope that surgery will become possible in the future.

[2.2] Radiation:

The method of radiation therapy includes an attempt to either cure or improve the symptoms of cancer bythe use of ionized radiation. It damages the DNA of cancerous tissue and kills it. To spare other normal or healthy tissues (such as organ or skin, through which radiation must pass to treat the tumor), shaped radiation beams are directed from many exposure angles to meet at the tumor, which provides a much larger dose there than in the surrounding, normal tissue. As with chemotherapy, cancers vary in their response to radiation therapy.

In about half of the cases radiation therapy is used. Sources of the radiation can either external or internal. These radiations are mostlylow energy x-rays for treatment of skin cancers, while x-rays of higher energy are used for cancers lies within the body. Radiation is sometimes used with combination of chemotherapy and surgery. For some types of cancer, namely early head and neck cancer, it can be used alone.

[2.3] Surgery

The primary method of treatment is surgery for most isolated, solid cancers and it may play a role in retrieving without curing and prolongation of survival. It is normally an important part of ultimate diagnosis and staging of cancer tumors, as biopsies are sometimes required. In local cancer, surgery normally attempts to remove the whole mass along with, in certain cases, the lymph nodes lie in the area. For some types of cancer this is sufficient to eliminate the cancer.

[2.4] Immunotherapy

Since 1997 a variety of therapies using immunotherapy, stimulating or helping the immune system to fight cancer, have come into existence. Some approaches include antibodies, checkpoint therapy and adoptive cell transfer.

[2.5] Laser Therapy

Laser therapy is the one which uses a high-intensity light to treat the cancer by shrinking it or destroying tumors. To treat superficial cancers which are on the body surface or inside the lining of internal organs Lasers are mostly used. It is also used in treatment of basal cell skin cancer and the other which are in very early stages like cervical, penile, vaginal, vulvar, and non-small cell lung cancer. It is sometimes combined with many other treatments, such as surgery, chemotherapy, or radiation therapy.

The Laser-induced interstitial thermotherapy (LITT), or as called interstitial laser photocoagulation, uses lasers to treat some cancers using hyperthermia, that uses heat to shrink the tumors by damaging or killing cancer cells. Laser are the most precise as compared to surgery and it causes less damage, pain, bleeding, swelling, and scarring. One disadvantage is surgeons must have specialized training prior to surgery to therapy. It may be more expensive than other treatments.

III. PROBLEM IDENTIFICATION

Today when we turn our heads towards heavy bills of hospitals and low chances of cancer being treated we got be depressed that even after having so much technology and high GDP of countries very few people were able to afford treatment even after getting early detection of cancer. We here are trying to develop a machine which can destroy tumors at very early stage and that too in very low cost. Today the radiation therapy which is being used involves very costly machine which very few hospitals can afford. During a study it has been found that 39% of people die of costly treatment; Moreover, maximum hospitals doesn't have facility because of heavy cost of equipment.

Other problems in current techniques is:

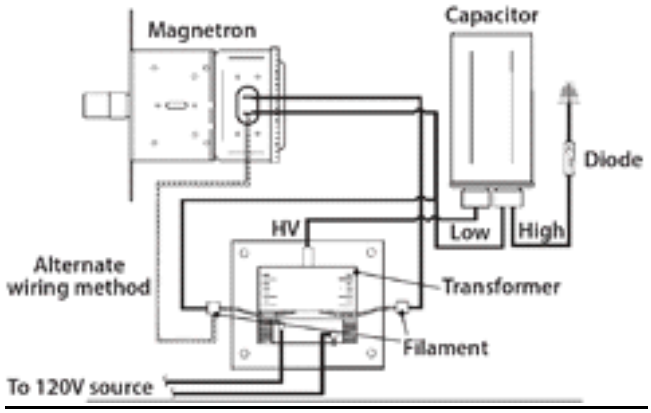
Surgery is one option, surgery is when the doctor is cutting into the body and removing the cancer, along with some body tissue to make sure that anything with this disease has been removed. But there are lots of disadvantage in surgery such as:

1. Bleeding and the possible need for a blood transfusion. Any operation has a risk of bleeding.
2. Getting an infection such as a chest or wound infection. And many more.

Other treatments are hormone therapy. Hormone therapy is when a drug is injected or taken orally by the patient. This therapy will stop the production of cancer and will start to produce healthy regular cells. Its disadvantages are:

- Side effects include erectile dysfunction and hot flushes
- May cause a temporary rise in testosterone (tumour flare)
- Visits to your GP or specialist rooms, or hospital will be required on a one, three or six monthly basis for injections
- These treatments help limit the spread of cancer cells but there are always going to be side effects like constipation, nausea, delirium, sleeping disorders and vomiting.
- Not all patients have the same experiences; it depends on how serious the cancer is and the physical condition of the patient. Some people go through a lot of treatments and still will not survive and others will successfully recover.

IV. METHODOLOGY



The above circuit figure is the circuit diagram of our project, microwave gun. The whole project is made by three elements which are used in our project.

1. Transformer
2. Magnetron
3. Capacitor

Now to understand this microwave gun first we have to understand the three elements. First we will see about the power supply of the microwave mains transformer.

•**Transformer:** -The transformer used in a microwave has two secondary windings. One winding in this transformer gives an output of **3.1 to 3.2 volts**. Second winding in this transformer gives output between the range of **1800-2800 volts (average of 2200 volts).** The low voltage of the transformer is used to light the filament in the microwave-generating vacuum tube called it as magnetron. In the front thereare a pink chemical element which is known as barium oxide.The lower voltage power up the chemical element of the magnetron which emits radiations. The radiations emitted by the magnetron then given direction by the waveguide. The high voltage AC output from the transformer is charged to DC and doubled using a voltage doubling circuit to power the magnetron. The high voltage is first transferred to the capacitor to remove the fluctuation of the AC into pure DC voltage.

•**Magnetron:** -Application of magnetron include radar, microwave oven, and the lightning system. In radar devices, magnetron use very short pulses of applied voltage. In microwave oven, a waveguide leads to a port in the cooking chamber. In lightning systems, such as Sulphur lamps and metal halide lamps, magnetrons also produce a microwave field. The nucleus of the high voltage systems inthe magnetic tube. The magnetron is a diode type electron tube which is used to produce the required **2450MHz** of microwave energy. This magnetron is a cavity magnetron. This cavity magnetron is a high powered vacuum tube that generates microwaves using the interaction of a stream of electrons with a magnetic field while moving past a series of open metal cavities. Electrons pass by the opening to these cavities and makes radio waves to oscillate within, similar to the way a whistle produces a tone when excited by an air stream blown past its opening. The frequency of the microwave produced, the resonant frequency is determined by the cavities physical dimensions. Unlike other vacuum tubes such as a klystron, the magnetron cannot function as an amplifier in order to increase the intensity of an applied microwave signal; the magnetron serves solely as an oscillator generating a microwave signal from direct current electricity supplied to the vacuum tube. In

this design the oscillation is created by the physical shaping of the anode, rather than external circuit of fields. The cavity magnetron consists of a large, solid cylinder of metal with a drilled through the center of the circular face. A wire acting as the cathode is run down the center of this hole, and the metal block itself forms the anode. Around this hole, known as the **Interaction space**, are a number of similar holes drilled parallel to the interaction space, separated only a short distance away. The parallel sides of the slots act as a capacitor while the anode block itself provides an inductor analog. The frequency of the resonating circuit is defined by the energy of the electrons and the physical dimensions of the cavity.

•**Capacitor**: - The capacitor here we are using is a super capacitor. The rating voltage of the capacitor is **2100 volts**. the rating capacitance of this supercapacitor is **1.10 microfarad.** The rating frequency in which the super capacitor works is **50 / 60Hz**. It is a two or three pin capacitor. The capacitor of microwave uses high voltage low capacitance connected in conjunction with a high voltage rectifier diode to work as voltage doubler. The capacitor is component which has the ability or capacity to store energy in the form of an electrical charge producing a potential difference across its plates, much like a small rechargeable battery. There are many different kinds of capacitors available from very small capacitor beads used in resonance circuits to large power factor correction capacitors, but they all do the same thing, they store charge. The capacitor consists of two or more parallel plates which are not connected or touching each other, but they are separated by air or by some form of a good insulating material such as mica, ceramic, plastic or some form of a liquid gel as used in electrolytic capacitors. The insulating layer between a capacitor plates is commonly called the **Dielectric.**

V. RESULT AND CONCLUSION

Result: -

The result of our project is, the microwave gun will remove the cancer from the human being's tissues completely. The blockage in the tissues due to the cancer will be removed permanently from the tissues. The cause of cancer is the blockage in the tissues because of growth of cells. The abnormal growth of cells blocks the flow of blood in the tissues due to which proper blood supply is not done in the body. Cancer is a group of diseases which involves abnormal growth in the cell which can spread to other parts of the body. The possible signs of cancer are lump, abnormal bleeding, cough for a long period of time, unexplained change in the human weightloss. The treatment to stop the cancer are radiation therapy, surgery, chemotherapy and targeted therapy.

Conclusion: -

The main aim for the diagnosis and treatment of cancer patient is to cure the cancer patient and live longer life. This treatment of cancer is needed to be linked to an early detection stage so that cases are detected at early stage, when the treatments are more effective and there is a greater chances of cure. It is also needed to be applied the current running program for the advance cancer patients, who can no longer benefit from the treatment, will get adequate relief from their physical suffering.

Where the resources are limited, the treatment should be provided to those people or patients presenting with curable cancer, such as breast cancer, cervical and oral cancer which are detected at early stages. The services should be provided in an adequate and sustainable manner, when more resources will be available, the treatment can be increased to other curable cancer patients and to those patients also who can no longer benefit but the treatment can make longer life survival to them.

VI. FUTURE SCOPE OF WORK

Microwave technology has been used in many types of applications for many years. Most of the military communication, including remote sensing through radar are done by the microwave technology. The telecommunication industries were focused on developing microwave technology and microwave electronics.

Now a day, there are even more applications for the use of microwave technology. This has come because of the major development and enhancement of high pulses microwaves and enhancement in much higher power systems than those systems which are available in the past. The future uses of this microwave technologyare: -

- One area where we can explore the use of microwave technology is that they can produce images of bones.
- We can use the microwave technology to create image of tissues.
- We can also detect the tumors present in the breast.
- This technology can be used to capture the dielectric properties, electric conductivity and permittivity o the tissues, which translates into detecting anomalies such as tumoursor other aberrations.
- The microwaves can also be used to cure cancer of a human being.

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