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## Assessment of the evolution of cancer treatment therapies: A Review

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### ABSTRACT:

The introduction of monoclonal antibodies and immune checkpoint inhibitors for the treatment of advanced or metastatic tumors, for which no effective treatment was available before. We frequently use the example of lung cancer .This review will help The Reader to acknowledge the role of some cancer therapy including surgery, radiation, chemotherapy andthermotherapy .understanding the value of treatment and upcoming therapy. Finally we briefly elaborate therapeutic research in Cancer .This review aims to present the various types of therapies used for the cancer treatmentand how they are evolved year to year.

Key words: Cancer, Immunotherapy, Radiation therapy, Genetherapy, Thermotherapy, Plasma treatment.

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### INTRODUCTION:

**Cancer:** - inactivation of specific genes leading to neoplastic transformations, or abnormal cell growth. It should be now possible to define which genetic and other alterations, or combinations thereof, can be interpreted as reliable biomarkers of exposures. By identifying changes associated with tumor cells and surrogate tissues associated with specific known and suspected environmental risk factors, it may be possible to identify particularly high-risk individuals and potentially design an efficient strategy for cancer preassociate

Various types of cancer are reported in literature. This review aims to present the various types, stages of cancer and also focus on various therapies used for the treatment of cancer. latest world cancer report provides clear evidence that global cancer rates could increase to 15 million by 2020 and is expected to grow to 21.4 million cancer deaths by 2030 New and more effective drug therapies are being developed due to the progress in the field of tumor biology and molecular genetics

A team of oncologists generally design the treatment for cancer and is based on the type of cancer and the stage of the cancer . Most treatments are premedicated specifically for each individual. Patients may obtain a unique tumor treatment protocol for their cancer. Various treatments used for the treatment of cancer include chemotherapy, surgery, radiation, or a combination of these treatments. The various advanced therapies included in cancer treatment are discussed below:

Immunotherapy:

Immunotherapy also includes the use of vaccines for the prevention of allergies and tumors. and better tolerance

The concept of boosting the immune system to target and destroy cancer cells, has been a goal of cancer treatment .

Antibodies: History

Antibodies (Abs) are one of the most important defence mechanism for vertebrate animals .they are produced by B cells which after antigen mediated activation undergo differentiation to secretary( plasma) cells the producing soluble antibodies .antibodies are highly specific and they recognize and eliminate pathogen and disease antigen ,but can be deliberately generated to recognize different target molecules ( tumormakers,tumors, transplant and auto human disease

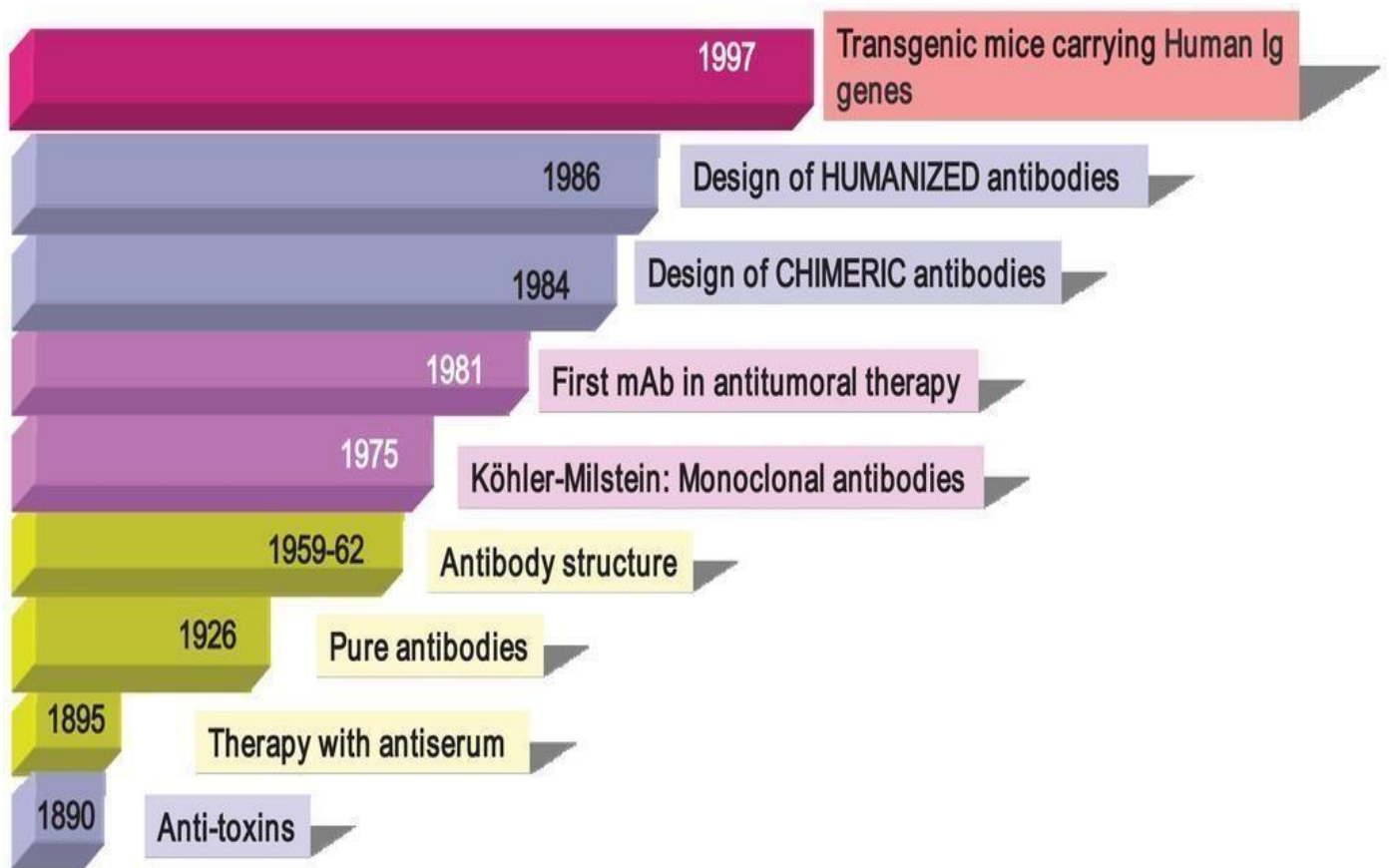


Figure 1:- History of antibodies..micecarrying human Iggenes and other animal models where used to produce fully human antibodies

#### Chemotherapy :-

chemotherapy is a treatment method where the patient is injected with different drugs that attack the cancer This type of treatment improves on more conservative surgical techniques in preserving the functionality of important organs.

Chemotherapy has been used since the late 1940's. Now a days, important molecular abnormalities are being used to screen for the new promising anticancer drugs and targeted therapies resulting in more advancements in chemotherapy. Various drugs are used in chemotherapy, such as Gemcitabine, Gefitinib, Azacitidine, Pemetrexed, Paclitaxel, Carboplatin, Docetaxel etc. The various routes of administration of anticancer drugs are oral (tablets, capsules) and parenteral (intramuscular, intravenous). Currently, chemotherapy is used as part of a multimodal approach to the initial treatment of different types of tumors, including locally advanced stages of esophageal, lung, head and neck cancer, pediatric solid tumors and soft tissue sarcomas. The actions of anticancer drugs relate to the cell cycle in the body. Chemotherapy is the choice of initial treatment. The main side effect of chemotherapy includes nausea, vomiting, hair loss, anemia, diarrhoea, constipation, low blood count, and fertility changes etc. Chemotherapy has made significant improvement in both early and advanced stage breast cancer with several notable studies identifying clear survival benefits. The Risk to benefit ratio of current therapies used in the treatment of breast cancer could be improved by using personalized therapies based on the molecular characteristics of the tumor. Chemotherapy has made successful management of various types of cancer.

#### Combination with chemotherapy-

Combination chemotherapy is the use of more than one medication at a time to treat cancer.

Traditionally, chemotherapy and radiotherapy were believed to mediate their anticancer effect by direct killing of the cancer cells. This concept was challenged the over decade ago by Zitvogel and co-workers who discovered that antineoplastic effect of a chemotherapy, in part depends on the immunogenic cell death of the cancer cells.

#### Radiation therapy :-

radiation therapy continues to be a crucial component of cancer treatment with the majority of all cancer patients acquiring radiation therapy. In order to achieve this goal various techniques of radiation therapy are urbanized as Fractionation, 3D conformal radiotherapy (3DCRT), Intensity modulated radiation. The radiation therapy may be done by various means, including external-beam radiation therapy in which a machine outside the body delivers radiations. DNA can be damaged directly or free radicals may be generated within the cells that can in turn damage the DNA by radiation therapy. Year 2011 has been designated as the Year of Radiation therapy in the UK to celebrate the 100th anniversary since Marie Curie won a second Nobel Prize for her research into radium. Intensity modulated radiotherapy

represents a noteworthy advancement in conformal radiotherapy IMRT is highly beneficial for patients with tumor targets that are concave and where normal tissue forestalling is clinically important .

Radiation therapy can be done in couple of a different ways .one method is where you sit a near machine that resemble a hospitals X-ray machine.

Learn about the types of radiation, why side effects happen, which ones you might have, and more Radiation is a physical agent, which is used to destroy cancer cells.

#### **Thermotherapy :-**

Thermotherapy has been used with the purpose to cure tumors for at least 4000 years, and as a tool to destroy tumor masses well before that period .

Depending on the location of the tumor in the body, there are several approaches to local hyperthermia, such as External, Intraluminal or endocavitary and Interstitial. Whole-body hyperthermia: In whole-body hyperthermia, the various techniques that elevate the body temperature to 107–108°F are used to apply heat to the tumor. It helps in the treatment of metastatic cancer, disseminated throughout the body. Nowa day, the concept of intracellular hyperthermia has emerged as a novel approach in which magnetic particles are made to accumulate at the cancer site and a magnetic field is applied to remotely heat them to accomplish hyperthermic temperatures (42-45°C) . drug, known as a photo sensitizer or photosensitizing agent having a specific wavelength of light is used for the treatment in photodynamic therapy (PDT). Thus, Specific photo sensitizers and light of particular wavelength are used to treat tumors in various areas of the body with photodynamic therapy. In photodynamic therapy for cancer treatment, photo sensitizer on injection into the bloodstream is absorbed by cells throughout the body, but the duration of stay of photo sensitizer is longer in cancer cells than in healthy cells. The tumor is exposed to light approximately 24 to 72 hours after injection as most of the anticancer drugs are excreted by normal cells up to this time period but stay in the tumor.

#### **Gene therapy :-**

Gene therapy aims to treat diseases by introducing DNA, RNA, small interfering RNA and antisense oligonucleotides into specific target cells or tissues to restore missing functionality and to eradicate pathogenic dysfunction.

Genes are made of deoxyribonucleic acid (DNA), a type of biological molecule and are located on chromosomes in cells. They have been identified in lung, brain, ovarian, prostate, colon, melanoma, pancreatic, breast and blood cancers . Gene therapy has been found to be one of the most promising novel therapeutic approaches for the treatment of various cases of cancer, not responding to traditional therapies It has gained importance in the treatment of chemo-resistant and radio resistant cases of cancer that lead to the failure of traditional therapies. Cancer stem cells possess the capability to self-renew and to cause the heterogeneous succession of tumor cells and are found within the tumor. There are different approaches for the treatment of cancer, which involves targeting either to healthy cells to enhance their ability to fight cancer . Some gene therapy techniques involve replacement of missing or altered genes with healthy genes

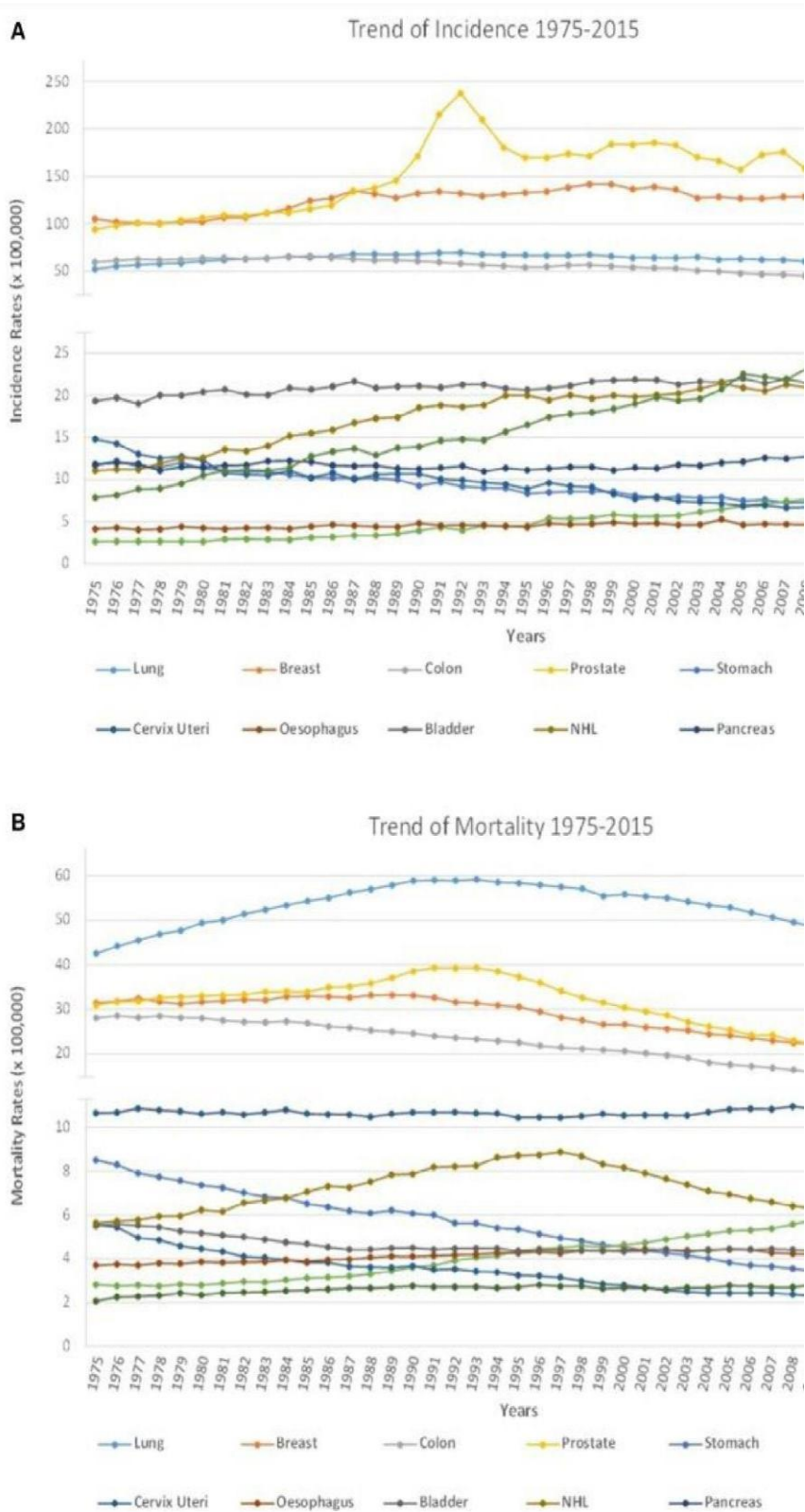
Gene therapy is intended as the introduction of a normal copy of a defective gene in the genome in order to cure specific diseases .The first application dates back to 1990 when a retroviral vector was exploited to deliver the adenosine deaminase (ADA) gene to T-cells in patients with severe combined immunodeficiency (SCID) .further research demonstrated that gene therapy could be applied in many human rare and chronic disorders and, most importantly, in cancer treatment. strategies are under evaluation for cancer gene therapy:

#### **Plasma treatment :-**

Plasma is a partially ionized argon gas, containing electrons, positive/negative ions, radicals, excited molecules, energetic photons (UV), and generating transient electric field.

#### **miRNAt therapy :-**

Binding of a specific miRNA to its target on an mRNA can inhibit its expression by a variety of mechanisms. it has also been defined as the modern disease for Excellence or even the quintessential product of modern medicine over the last 40 years showed that there has been a continuous and almost stable increase in incidence rates of all cancers.



Thanks to cancer prevention and screening strategies the number of many types of cancer has decreased. In particular, for cervix uteri and stomach cancers, a decrease in incidence rates was observed, while the incidence rates for esophagus, bladder, lung and colon remained unchanged. rates from 1975 to 1995, and a general decrease in mortality rates recorded above all in the last 20 years.

the discovery and application of X-Ray for the diagnosis and treatment of some tumors their has been a period of standoff for a research of new treatment to be used in Cancer care., A Thousand men and women previously exposed to the gas died due to complications characterized by bone marrow Aplasia.

#### **Photodynamic Therapy :-**

The subsequent oxidation of lipids, amino acids and proteins induces cell death. A complete review of photosensitizers is reported elsewhere

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#### **Conclusions :-**

This review has tried to summarize the history and evolution of the most common types of the treatments available today but also new therapy under study in the last years. health tissue and increase efficacy by targeting target tumor angiogenesis, by exploring cell and gene therapy ,or by using new Nanostructure for diagnosis are the therapeutic purposes .

However the history tells us that fight against the cancer is not an easy task .many types of the cancers are able to resist conventional therapies, and different combinations of the drug and therapies(e. g., survey together with radio therapy and chemotherapy) are usually only way to destroy the tumoral cells.this maybe also true for new therapy arriving now to clinic. much more studies are required but these new ways of a treatment are opening doors to hope for many patients waiting for a successful therapy.

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