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Review Article

Recent Therapy to Treat Various Types of Cancer: An Overview

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Abstract:
Cancer is a fatal condition brought on by unchecked cellular growth. One of the gravest dangers to people worldwide is this. Both the incidence and mortality of cancer are rising. With their great benefits, particularly in the treatment of cancer, nanoparticles have revolutionized the globe. Conventional chemotherapy used to be the main treatment option for patients. Chemotherapeutics, however, also have several pharmacological drawbacks, including drug resistance, drug-drug interactions, water solubility, and stability. Reciprocally, dose-limiting toxicity is important, with non-specific toxicity to healthy cells, appetite loss, hair loss, peripheral neuropathy, vomiting, fatigued muscles, and diarrheal being the usual side effects. Drug delivery systems employ nanocarriers such as gold nanoparticles, high-density lipoprotein nanostructures, polymer nanoparticles, dendrimers, quantum dots, and nanodiamonds.
Keywords: Nanotechnology, Cancer, Drug delivery

1. Introduction:

Cancer is defined as the uncontrolled proliferation of cells is known as cancer. it is divided into two types of cancer 1. Benign and 2. Cancer therefore benign is a localized tumor and the malignant one which spreads from one Organ to another is called cancer. this property is known as metastasis carcinogenic it is causing agent of cancer and neoplastic cell divided into classifications are

1. Physical agent for the paradigm is sharp teeth and kangri cancer (cause of fume by cola), <radiation > ionizing(for paradigm: x-ray,gamma rays) and nonionizing (UV -rays)SPF (sun protection factor)
2. Chemical carcinogen: forexamplecoal tar and asbestos (talc powder contains), alpha toxin
3. Biology carcinogen: oncoviruses.

MECHANISM OF ACTION CANCER:

1. When the tumor suppressor gene and apoptosis (programmed of cell death) are activated and inhibition of proto-oncogenes. then not formulation of cancer cell
2. If the proto-oncogene is converted into oncogenes to the active, then the cancer cell is the cause.

< While if the tumor suppressor gene and apoptosis are inhibited >

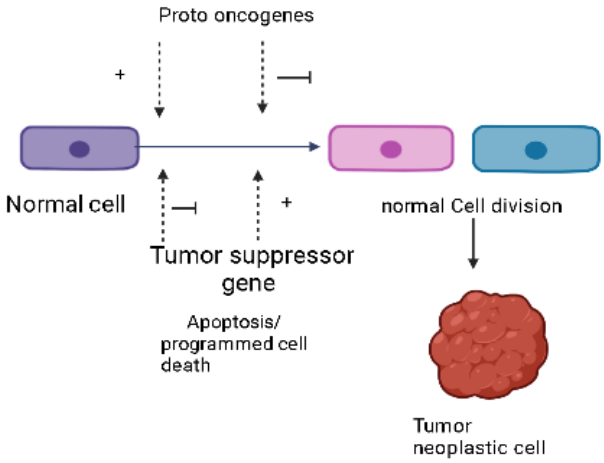

Figure 1: Mechanism of cancer

PROPERTIES:

- They do not show the contact inhibition
- They are the different cell
- High demand for glucose
- Not dependent on external exogen growth factor
- Angiogenesis (formation of new blood vessels)

CANCER DETECTION AND DIAGNOSIS:

Initial detection of cancers is vital as it allows the diseases to be effective in many cases. cancer detection is based on surgery (neglecting the tissue or labas tested) and histopathology studies of the tissueand marrow tests for increases in the cell count in the case of leukemias. and diagnosis are radiological diagnosis,histological diagnosis,(biopsy), cytological diagnosis (cytosis tissue), frozen section,immune histochemistry, tumor markers, hematological diagnosis (leukemias ((which contains WBC count),molecular diagnosis (MRI(magnetic resonance imaging shows the most accurate and most sensitive results), and CT scan.

TYPE OF CANCER THERAPY:

- Surgery therapy (benign)
- Radiation therapy (used in thyroid cancer)
- Chemotherapy (drugs used in related to the cause of cancer for paradigms are vinblastine (bs: vincarosseas)and taxol from the titanium toccata and its side effect of drugs in hair follicles.

Nanotechnology in Cancer Diagnosis:

As we know that nanotechnology this technology is worked in very small particles size (1-100nm) of arrangement regular manner to convert into a solid material (benign) and matter. And to make the structure of the compoundand synthesis of medicine formulation. In its severest definition from the National Nanotechnology Initiative.

Cancer diagnosis:

At present, tomographyis both a morphological examination with tissue(histopathology) or cell (cytology) early detection of cancer. The most popular imaging methods, including X-ray and ultrasonography, endoscopy, computed tomography, and magnetic resonance imaging (MRI), only can identify cancer when there are observable changes in the tissue Nanotechnology -based diagnostic Promising techniques are being created as instruments for quick, easy, and affordable cancer diagnostics. and detection.

Nanoparticle Physiologic and Biochemical Properties:

Chemotherapy may, be pharmaceutical anticancer drugs. The tumour tissue has spread

through unfortunate precision and dosage-preventive toxicity. Nearby are numerous difficulties to these methods; for paradigm, oral administration of tablets or capsules might result in muddled pharmacokinetics due to the experience of these agents to the metabolic pathways of the body (2). This can lead to the administration of more than necessary doses, which can increase toxicity. (5).

It stood in 1975 that Ring Dorf projected A polymer-drug couple classical that this could improve the provision of an anti-cancer model. (6). It has the future only pharmacological properties of a polymer-drug conjugate pattern. may be impaired by modifying the physical and chemical characteristics of the polymer. For example, an unsolvable drug may be. Complete Soluble in water by familiarising the solubilising halves with the polymer, thus enhancing its bioavailability and biodegradability.

Dendrimer and Dendrimer for cancer therapeutics :

Polymers are in multiple branches known as dendrimers, which may be explicitly Thought of as a pressure ball. Dendrimers are nano molecules, starting from the multifunctional core unit. The structure of the coat (skins) is similar to that of the onion. in three magnitudes from the inside and outwards. dendrons are defined as a branched structure like (CH2)3 or CH2-CONH-CH2- linked to the core, the end group which may be turned into the terminal end group is located on the surface of the dendrimer which has designated as the periphery.

Dendrimers remained Presented It's the first time through Fritz Vogtle et al. in 1978[83]. The dendritic assemblies that have been methodically investigated and established widespread focus are Tomalia's(PAMAM) [84, 85] and the 'arboreal system' of Newcome[86,87] is the dendritic structures that have been extensively explored and increased widespread attention.

Cancer cells accepting J. The remedy for these restrictions is dendrimer modification. As reported so far, chemical alteration, co-polymerization Hybridization with different nanocarriers and using a linear polymer are options to get over these restrictions.[89]. Peptides, proteins, sugars, aptamers, antibodies, etc. can modify the surface of dendritic structures in order to aggressively target the cancer location. For many stimuli-responsive systems, including protein and enzyme transformation, light, heat, pH change, and other changes, the dendrimer surface may also be changed.

Rawding PA, Bu J, Wang J, Kim DW, Drelich AJ, Kim Y, Hong S. Dendrimers for cancer immunotherapy: Avidity-based drug delivery vehicles for effective anti-tumor immune response. Wiley Interdisciplinary Reviews: Nanomedicine and Nanobiotechnology. 2022 Mar;14(2):e1752.

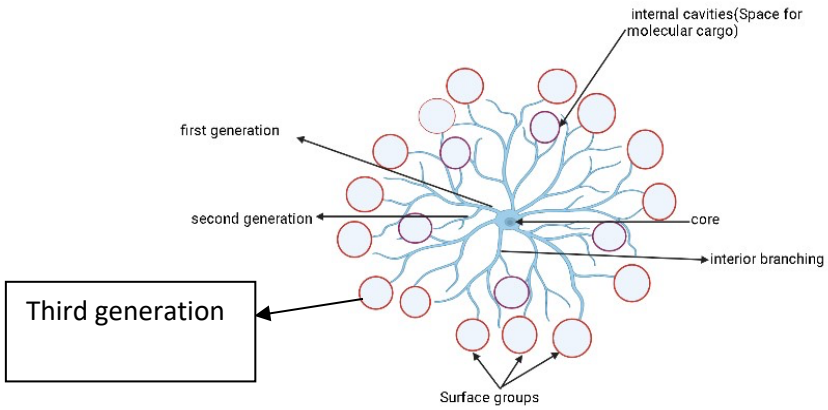

Figure 1: General structure of dendrimer structure

LIPOSOMAL AND ROLE IN CANCER TREATMENT:

Liposomalare spherical shape vesicles cutting-edge which as aqueous size core is fully enclosed by phospholipid bilayer molecules. the size of liposomes is 20 nm range

Liposomal were first produced in England in 1961 by Alec D.Bhangham .the liposomal consists of two components 1. Fatty acid(cholesterol and methanol) 2. Phospholipid

The first drug of liposomal is discovered in 1946 Doxorubicin HCL liposomal.

TYPE OF LIPOSOMAL:

According to their size and the number of phospholipid membrane layers, liposomes are categorised. (Akbarzadeh et al. 2013; Pattni et al. 2015)

MLVs, or multilamellar vesicles:Several concentric phospholipid bilayer membranes that are separated from one another by water make up liposomes. These are enormous and can reach a size of 5 mm.

SUVs, or Small Unilamellar Vesicles: A single lipid bilayer encloses an aqueous portion of these liposomes. These liposomes may range in size from 20 to 100 nm.

Large Unilamellar Vesicle (LUV): These liposomes consist of a single lipid bilayer and an aqueous compartment. The size of these liposomes ranges from 100 to 250 nm.

LIPOSOMAL'S PART IN CANCER:

The use of liposomes in cancer treatment has proved successful. However, the use of liposomes as cancer therapies has received the most significant liposome therapeutic bids, nevertheless, are covered in this article. Several different liposomal formulations of anti-cancer agents have been shown to deliver the drug at the site of solid tumors with minimum toxicity as compared to the free drugs. (much study and evaluation, although this is outside the purview of this review Allen and Cullis 2013; Sutradhar and Lutful 2014).

TARGETED LIPOSOMES IN CANCER THERAPY– LIGAND-BASED TARGETING:

One of the flexible drug delivery systems, liposomes are capable of delivering active metabolites to various tumor locations [63]. As was mentioned in earlier sections, liposomes are spherical-shaped vessels that may contain both hydrophilic and hydrophobic medicines. Their sizes range from 100 to 200 nm. Additionally, liposomes may be superior to other formulations and able drugs due to their superior systemic circulation time, lower systemic toxicity, and superior drug delivery at the tumor site [64]. The improved efficacy of drug-loaded liposomes is due to a multi-step process including both passive and active targeting mechanisms. The eruption and retention of particles smaller than 350–700 nm into the interstitial tumor space as a result of highly absorbent tumor vasculature are known as the increased permeability and retaining (EPR) effect.and poor lymphatic drainage from the tumor site is the primary mechanism for passive targeting.

The EPR effect enables tumor targeting with unreceptive direction. Furthermore, Liposome compositions lessen the drug's sensitivity in healthy tissues, giving a mechanism for increased accumulation at the tumour site while also allowing for related off-target effects. because liposomes cannot cross the entire incessant except in the liver and spleen, which have the distinct architecture of the vasculature and endothelium and do not localise there.[66]. When passive targeting reaches its limits, the energetic targeting of liposomes is also carefully considered. The active targeting of particular cells types of drug delivery to cells expressing the target surface receptor(s) of interest is made possible by the conjugation of ligands to the liposome surface, including fragments, proteins, peptides, carbohydrates, glycoproteins, aptamers, and minor molecules. The verb form of one orLiposomes with more ligands on their surface binds to target receptors expressed on the surface of tumor cells, enabling active targeting. Depending on the kind of tumor,

ligand-directed liposomes may be able to deliver more medications than non-ligand liposomes since actively targeted liposomal formulations combine passive and active drug delivery mechanisms. Today, almost all liposomal formulations are ligand-independent, allowing for tumor accumulation only through passive targeting. In spite of numerous Preclinical experiments that have been conducted using various formulations. the FDA has only approved a small number of liposomal formulations for use in clinical settings.

According to Wang et al. [72], conjugate liposomes containing ER-over articulating breast cancer cells directly bound and took up doxorubicin. [71]. This led to innovative anti-cancer action with little macrophage and phagocytosis. Instead of using the full antibody to actively target tumors, Antibody fragments such as single-chain fragment variable [scFv] and fragment antigen-binding [Fab'] have been used.This approach resulted in a smaller reduction in the probability of antibody inactivation during surface functionalization to produce immunoliposomes. Due to the tiny size of the antibody attached to the surface of the liposomes, it is predicted that smaller immune liposomes will also infiltrate the target tumor locations more efficiently. [73]. In a different investigation, benzetimide-containing liposomes were created to transport the ganglioside GD2 [74]. They promoted apoptosis in melanoma and neuroblastoma cell lines, which enhanced anti-neuroblastoma action in a mouse model both in vitro and in vivo [75]. RES absorption of liposomes has been found to interfere with such liposomes' binding, even though antibody-mediated active tumor targeting by liposomes is known to be very effective and selective. PEG chains have been shown to block liposomes from being taken up by RES. More optimization of different formulation parameters would be required to fully realize the efficiency of antibody-mediated targeting of liposomes for cancer therapy

NIOSOMES:

Noisome remain manufactured tiny vesicles with an aqueous centre surrounded by a bilayer containing cholesterol and single or additional nonionic surfactant. vesicle stay prepared from self-assembly of hydrous nonionic surfactant molecules (NISV)

Role of niosomes in cancer treatment:

As lipid-based particles with an aqueous portion enclosed by lipid bilayers, NISV, also referred to as Niosomes, are structurally similar to liposomes and can enclose drugs as well as act as drug transporters. Niosomes were first developed for the cosmetics sector, but interest in them as a medicine delivery mechanism surged in the meantime. 1998 (Uchegbu and Vyas).

CARBONANOTUBE(CNT):

Carbon nanotubes are tube-like materials, made of carbon, with a diameter measuring at the carbon nanometer scale. Nanotube is formed essentially from Both the graphite sheet and layer resemble a rolled continuous hexagonal unbroken mesh with carbon molecules on top of the hexagons.it is one of the greatest explored nanomaterials. Furthermore, single-walled carbon nanotubes (SWCNTs) were created in 1993 by Iijima and Ichihashi [3] and Bethune et al. [4]. CNTs have sparked a tremendous amount of interest since then. Because of their distinct physical and chemical features, including as exceptional mechanical strength, outstanding thermal conductivity, a large surface area, an efficient electron transfer rate, and ease of functionalization [5-7], they are widely used.

ROLE OF CNT IN CANCER TREATMENT:

Surgery continues to have an important role in early cancer survival by eliminating thescreening barrier among all cancer treatment choices, including chemotherapy, radiation therapy, thermotherapy, immunotherapy, etc. Chemotherapy and radiation treatment are required for patients with advanced cancer and those who have undergone palliative surgery. Even for patients who have undergone major

tumor excision, radiochemotherapy, and other therapies are occasionally advised to stop recurrence brought on by lingering micrometastases. Although these techniques can be useful in some situations, their lack of selectivity can lead to systemic toxicity at the same time. A novel class of nanomaterials for cancer therapy may be created using the transport abilities of Carbon nanotubes with appropriate surface modifications and their unique physicochemical properties.

Drug delivery by CNTs:

A drug delivery system is often created to enhance the therapeutic and pharmacological characteristics of medicinal molecules[32]. All of them limit the clinical administration of chemotherapy agents, most notably the absence of clinical procedures to treat multiresistant cancer (MDR) [33]. In recent years, these issues have received substantial study on a global scale. In particular, many other useful compounds, including medicines, peptides, and nucleic acids, may be incorporated into the walls and tips of NCTs because of their distinctive characteristics, particularly their ultra-high surface area. Researchers have demonstrated that functionalized CNTs may pass the mammalian cell membrane by endocytosis or other methods [7,10,40,41] With the use of particular peptides or ligands on their surface to bind cancer-specific receptors on the cell surface, CNTs can convey therapeutic pharmaceuticals into previously inaccessible cells more safely and efficiently, making them candidates for medication delivery[5].

GOLD NANOPARTICLES:

An alternative name for AuNPs is gold colloids. Colloidal gold is a sol or colloidal suspension of sub-micrometer gold nanoparticles in a fluid, typically water. The liquid is typically either intensely red (for particles less than 100 nm) or yellowish-dirty (for larger particles). Gold nanoparticles are excellent at scattering and absorbing light. They also can mimic the scattering properties of living cells, which facilitates the easier detection of cancer.

Epidermal growth factor receptor (EGFR), a protein that is found on the surface of many cancer cells, is normally not expressed as strongly in healthy cells. This can be changed by conjugating, or binding, gold nanoparticles to an anti-EGFR antibody.

Role of gold nanoparticles in cancer treatment:

The size of many biomolecules is equivalent to that of incredibly tiny nanoparticles. Nanostructures may easily have their characteristics changed to better fit their environment in a biological system. For drug delivery to the nucleus, gold particles that have been engineered with the simian virus (SV40) nuclear localization signal are frequently utilized [43]. The nano-peptide complex is frequently injected straight into the cytoplasm close to the nucleus. Recently, Au NP coated with mycobacterium and a cell-penetrating peptide were utilized to infiltrate a membrane-bound compartment within the HeLa cells, where Au NPs are coupled with peptides by linking agent. Tat peptide may be employed to translocate Au NPs into the nucleus. [44].

A study demonstrates that surface functionalization is necessary for the cellular absorption of Au NPs. The kind of ligand, its molecular weight, and the density of the graft are important variables that affect cellular absorption. According to the report's findings using laser scanning confocal microscopy and flow cytometry, the size of Au NPs does not significantly affect cellular uptake. The smaller Au NPs, however, displayed better cellular absorption and benefits in multicellular tumor spheroids [45]. The form of the NPs and the kind of cell have an impact on how well Au NPs are absorbed by cells. The research was done to see how Au NP form affected RAW264.7 cells. The experimental findings demonstrated that the triangle-shaped Au NPs are more effective than the rod-shaped ones.The star-shaped Au NPs showed the lowest cellular uptake in RAW264.7, however [46].

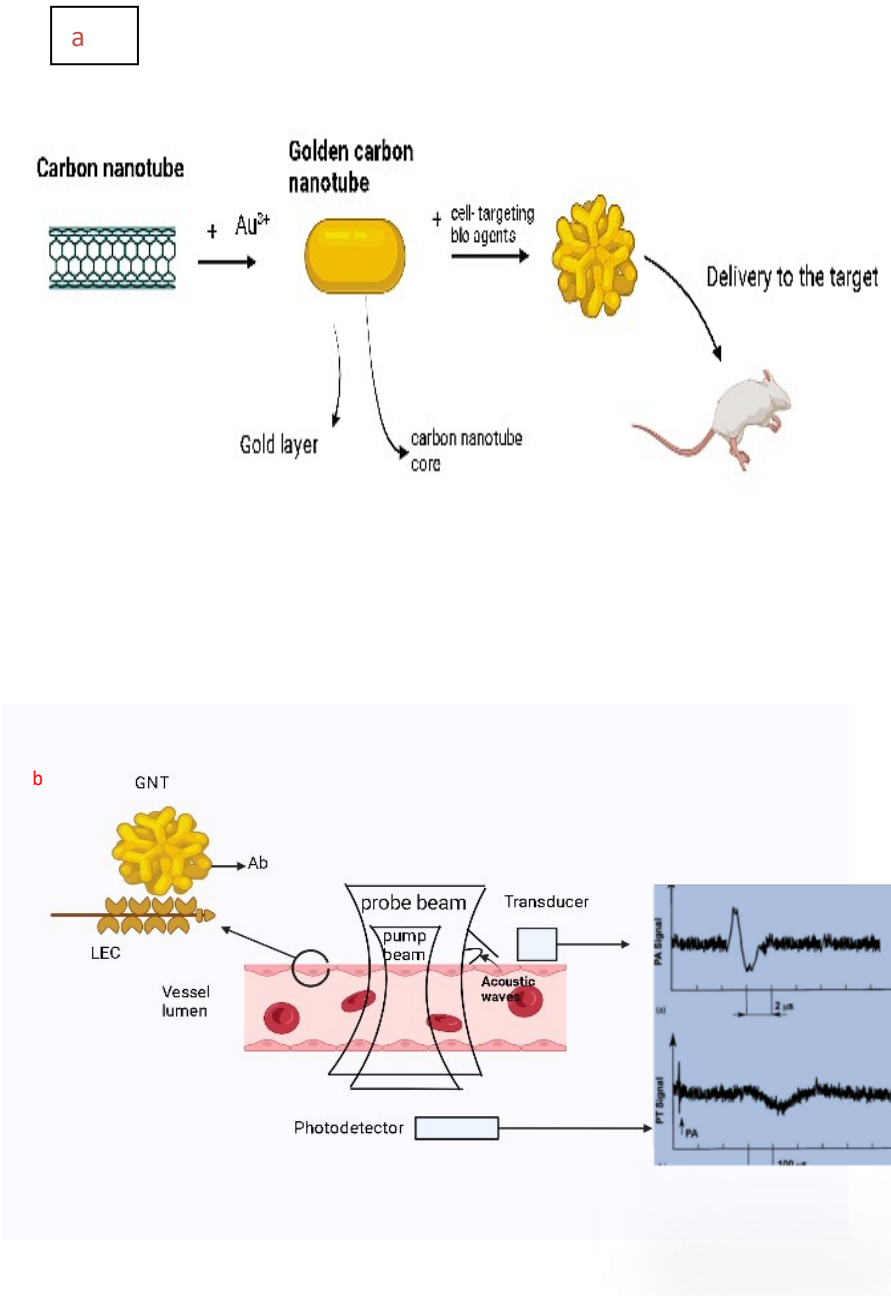

Figure 2: Golden nanotube used for imaging agent to detect the tumor cell

SILVER NANOPARTICLES

Due to the wide range of uses for which they are suitable, silver nanoparticles offer several advantageous sizes- and shape-dependent features, including optical, chemical, magnetic, and physical characteristics (Vikesland et al., 2012). According to Abbasi et al. (2014), they may be used in a variety of goods, such as biosensors, composite fibers, antimicrobials, cosmetics, and electrical compounds. According to Abbasi et al. (2014), silver nanoparticles can also be employed in cell electrodes, filters, drug delivery, medical imaging, and nanocomposites. Due to its superior light absorption, superior resolution, and superior affinity for functionalization, silver is favored over other nanoparticles (Nedelcu et al., 2014).

ROLE OF SILVER NANOPARTICLES IN CANCER:

LEUKEMIA

The bone marrow is where leukaemia, a kind of cancer, often begins. Leukaemia generates a lot of abnormal white blood cells. For younger patients, leukemia therapy has advanced significantly in recent years, but the prognosis is still grim for elderly patients, whose life expectancy is only a few months. Since traditional chemotherapy frequently fails to provide the desired results, different treatment modalities are actually required. Silver nanoparticles kill leukemic cells when mixed with chemotherapeutic drugs like daunorubicin, cyclophosphamide, or busulfan. Guo et al.'s (2013) discovery that PVP-coated silver nanoparticles can decrease the survival of low-concentrate separated acute myeloid leukemia (AML) cells refers to a ground-breaking novel therapeutic approach. This new strategy is built around the idea of using reactive oxygen species (ROS) as mediators. The induced oxidative stress levels of the silver nanoparticles are the result of nanoparticle localization in the mitochondria, which determines the acidification of the intracellular environment as a result of the release of silver ions combined with specific drugs (Krystek et al., 2015).

BREAST CANCER

Due to the present chemotherapeutic medicines' lack of specificities, such as doxorubicin, daunorubicin, bleomycin, and cisplatin, alternative treatments have been developed (Jeyaraj et al., 2013a,b). Silver nanoparticles have a dose-dependent lethal impact on MCF-7 breast cancer cells via inducing apoptosis (Raman et al., 2015). Monactisdubia nanoparticles were utilised by Raman et al. to produce IC50 values of 31.2 g/ml. When using a fungal extract as a reduction agent to create nanoparticles, Yehia and Al-Sheikh (2014) noted identical doses. According to Gurunathan et al. (2013a,b), silver nanoparticles triggered MDA-MB-231 cell death by activating caspase 3, creating ROS, and fragmenting DNA. These mechanisms were also covered by El-Sonbaty (2013), Syedet al. (2013), and Priyadharshini et al. (2014).

LUNG CANCER:

Lung cancer is the most common cause of cancer-related death and it occurs most often between ages 40 to 70 years.

Classification of lung cancer is of two types of classified as 1. Histological types 2. Clinical types

In histological there are five types of lung cancer in histological

- Squamous cell or epidermoid carcinoma (it's the most type common lung cancer in India and in smoker types also and it arises in the centrally (hilar) from the segmental)
- Adenocarcinoma (including brochio alveolia carcinoma)
- Small cell carcinoma
- Large cell carcinoma
- Combined of both tumour squamous cell and adenocarcinoma

1. Squamous cell means keratinization and intracellular bridges and keratinization may take the form of squamous pearl .its have markers in market the name of markers of squamous cell carcinoma is cytokeratin.
2. Adenocarcinoma its most common type in world and woman and non smoker .its is the peripheral carcinoma four type are included:

- Acini :predominance of glandular structure
- Papillary :it is figure like structure
- Bronchioalveolar /lepidic :cuboidal to all, columnar and mucus and in this tumour are separating over the pre-existing alveoli.
- Solid with mucin productivity
  - The markers for adeno are cytokeratin 7 and specific is TTF

3. Small cell carcinoma(oat cell carcinoma)

Small cell carcinoma is also a strong relationship to cigarette smoking (also squamous cell carcinoma)

They occur both in major bronchi (central)and in periphery in the lung

In the clinical types, there is two classified of lung cancer

- Small cell carcinoma
- Nonsmall cell carcinoma

Small cell carcinoma(SCC) its infected (20-25%) the treatment of small cell carcinoma and the prognosis of SCC are different from the rest of them this its why necessary separate and identified sccseparately so that small cell carcinoma very prognosis and treatment most in radiotherapy and chemotherapy its both was contradicted.

Non-small cell carcinoma(70-75%) are included squamous cell and adenocarcinoma, large cell carcinoma

Combined /mixed of squamous cell carcinoma and adenocarcinoma

The mutation is taking place in lung cancer of two types of mutation are included 1.EGFR mutation 2.VEGFoverexpression.

Squamous cell carcinoma	**Adenocarcinoma**	**Small cell carcinoma**	**Largecell carcinoma**
MC type of lung cancer in smokers	Overall MC type of lung cancer	Associated with smoking	
MC type in males	MC type in nonsmokers and females	Commoner in smoker	
Usually central in location9(arises from the segmental bronchi)	Usually peripheral in location (arise from the terminal bronchiole)	Central in location	Central in peripheral
Show the highest frequency of p53 mutation	Associated with k rase mutation	Immunohistochemistry show the highest expression of the Bcl2 gene in the majority of tumor	
Its showsthat hypercalcemia due to PTHrp is the MC paraneoplastic syndrome		Associated with the maximum paraneoplastic syndrome (particularLy SIADH and Cushing syndrome	Has a gynecomastia as a paraneoplastic syndrome.

Nutan Rani et all synthesised ZnO nanoparticle (L1-NPs) using extract of leaves of *Azadirachta indica* (Neem tree). The results suggested that the viability of A549 cells have been significantly decreased by ZnO NPs synthesized with leaves extract as well as only extract (OE) of leaves of *Azadirachta indica* (Neem tree) in a dose-dependent manner. In addition, we have observed that the cell viability could be significantly reduced with an incubation period of 48 h at 100, 150,200 and 250 µg/mL.

HaithamAmin et all synthesised high-quality Gef-StNPs that can deliver and concentrate the gefitinib (Gef) at A549 cells, The result suggested that the in vitro cytotoxicity after exposing the A549 human lung cancer cells to the optimized Gef-StNPs was found to be much higher than that of the pure Gef.The optimized Gef-StNPs formula showed superiority over the pure Gef regarding the cellular uptake in A549 human cell line.

Breast cancer:

1. Breast cancer: breast cancer arises in the lining cell (epithelium) of the ducts(85%) or lobules(15%)in the glandular tissue of the breast .initially the cancerous growth is confined to the duct or lobule (in situ) where its generally cause no symptoms and has minimal potential for spread (metastasis).

Overtime these in situ(stage0) cancer may progress and invade the surrounding breast tissue(invasive breast cancer).hen spread to the nearby lymph nodes (regional metastasis) or to other organs in the body (distant metastasis). If a woman dies from breast cancer, it is because of widespread metastasis.

- The normal breast structure is :

The breast is a modified skin appendage . it is functional in the female during lactation nit it is rudimentary in the males for always. Its have two types tissue components 1. Epithelial 2. Stromal * stromal components comprise 90%* epithelial (ductus, lobules terminal ductus) components comprises 10% but is more significant pathologically since the majority of the lesion is occupied of this portion of the breast.

- The breast is divided into the 20 lobule
- Each lobe consists of breast lobules
- Each lobule contains of ductules or acini
- Ductules or acini open into terminal ducts
- And this known as terminal ducts lobular units (tdlu)
- Terminal ducts drain into the nipple through the lactiferous duct
- Lactiferous ducts show a small dilatation called a lactiferous sinus**.**

Classification of breast cancer are :

- ✓ Noninvasive/in situ carcinoma are involved is in ductal and lobular
- ✓ Invasive cancer (ductal and lobular)

STUDY OF BREAST CANCER IN NANOPARTICLES :

Three breast cancer cell lines, MDA-MB231, SKBR3, and MCF-7, were used to examine the anti-tumor effects of synthesised LNP by Ikumi Nakashima et al. in vitro. LNPs encapsulated with eGFP or iC9 mRNA and chemical dimerization inducers were used to treat tumour cells. All three cancer cell lines could be effectively delivered encapsulated GFP mRNA by LNPs (target cells expressed GFP at >80%).The outcome demonstrated that all cancer cell lines were susceptible to the lethal effects of CID (chemical inducers of dimerization) when tested in vitro.

In the work by Iman Akbarzadeh et al., the in-silico characteristics of gingerol (Gin) and letrozole (Let), two possible anti-cancer medications, were examined, and several substantial ADME disadvantages were anticipated. The recommended results were made, functionalized with zinc, amine, and graphene oxide (GO) (MZNG), and used to load and distribute both to breast cancer cells in-vitro. Let the mean diameter of the Gin-loaded MZNGs' spherical structure be 210 nm. The MZNGs provide Let and Gin with a pH-sensitive prolonged release profile and a high entrapment efficiency. Overall, the developed nano-formulation shows tremendous potential for treating malignancies other than breast cancer.

Arokia Vijaya AnandMariadoss et all are synthesisedHelianthus tuberosus (Ht) extracts were used to create copper oxide nanoparticles (CuONPs), which were then wrapped in starch (ST) and conjugated with folic acid (FA) to enable targeted release in MDA-MB-231 cells. These nanoparticles (NPs) were given the designation FA-ST-HtCuONPs. The cytotoxicity results showed that FA-ST-HtCuONPs (21.03 1.85 g/mL) had the highest inhibitory concentration (IC50) for killing human breast cancer (MDA-MB-231) cells by inducing reactive oxygen species (ROS) production, causing nuclear damage, lowering mitochondrial membrane potential, and upregulating the expression of apoptosis-related proteins. Overall, the findings demonstrated that for improved breast cancer therapy, folic acid and starch decorating promoted the NPs penetration in cells through folate receptor-based endocytosis.

STOMACH CANCER:

In terms of prevalence and incidence, stomach cancer ranks fifth among all cancers and is the fourth greatest cause of death for both men and women [71]. While the incidence and death rates of stomach cancer in both men and women are substantially lower in India than in Eastern Asia and Eastern Europe [71], they are extremely high in the north-eastern regions of India, particularly in Mizoram ([33]). Stomach cancer is the most prevalent cancer in Aizawl, Mizoram, according to the National Cancer Registry Programme's data, with 44.2 cases per 100,000 males and 21.7 cases per 100,000 women ([33]). Mizoram's high rate of stomach

cancer has been linked to local customary food practises and perhaps unknown genetic factors.

AliJadidi et all synthesised In this work, hollow mesoporous silica nanoparticles (HMSNs) were combined with gefitinib (GB) and mussel-inspired polydopamine (PDA) to create HMSNs-GB-PDA, a pH-sensitive drug delivery system for the treatment of gastric cancer. PDA was utilised as a stimulant, mucoadhesive enhancer, gatekeeper, and anticancer factor to modulate the release of the GB. The findings demonstrated that HMSNs-GB-PDA not only killed AGS cells in a targeted manner but also had no harmful effects on HGF cells, resulting in the elimination of more than 70% of AGS cells at a GB dosage of 150 ug/ml.

Jean de DieuHabimana et all are It is crucial to provide quick, non-invasive diagnostics for Helicobacter pylori (HP) in order to avoid related conditions as gastritis, ulcers, and cancer. Therefore, determining the genotypes of CagA and VacA might detect current infection and help select the best therapies. With extended reporters and reductants (CEXTRAR), we have improved LbCas12a trans-cleavage activity for HP early detection. The findings indicated that our work opens up the possibility of manipulating reporters and rethinking precise cysteine substitution by protein engineering for Cas variants with improved catalytic activity for use in genetic engineering and diagnostics.

OVARIAN CANCER :

Like other malignancies, ovarian cancer (OC) is a spectrum of illnesses and is the fifth most common cause of cancer-related mortality in women.According to Figure 1, 1 OC contains stromal and primitive ovarian sex cord cells as well as epithelial, germ cell, and sex cord-stromal tumours emerging from surface epithelial cells, from the germ cell or the oocyte, and from these sources. It is difficult to define criteria for differentiating between benign and malignant tumours because to the histological and molecular variability of the sex cord-stromal and germ cell types, which account for 8% and 3-7% of the malignant ovarian tumours, respectively. The prognosis is generally favourable for stromal tumours and germ cell tumours.

OzgeEsim et all are synthesised the first-line therapy of ovarian cancer frequently involves the use of carboplatin. Platinum resistance restricts the effectiveness of treatment in the clinical context even though the majority of patients respond to platinum-based therapy. In this work, to control the platinum resistance, we created a pH-responsive lipid-coated nanoparticular system that was co-loaded with carboplatin and decitabine. Additionally, the effectiveness of the nanoparticular system was highly corroborated by evidence of apoptosis by caspase and PARP cleavage in both cells. The findings indicated that the proposed nanoformulation has excellent promise for the treatment of ovarian cancer that is both platinum-sensitive and platinum-resistant.

In the current work, zinc oxide (ZnO) nanoparticles of the wurtzite (WZ) type were created and functionalized with quercetin (ZnO@Quercetin) to cure ovarian cancer. The results indicate that ZnO@Quercetin nanoparticles' in vitro cytotoxic activity shown good efficacy by inducing intracellular oxidative stress and depolarizing mitochondrial membrane potential in human ovarian cancer cells. The dual-staining experiment demonstrated that ZnO@Quercetin activates the intrinsic apoptosis signalling pathway in PA-1 cells to produce late apoptosis. The results of the current study taken together suggest that ZnO@Quercetin nanoparticles may be effective in treating human metastatic ovarian cancer.

Cervical cancer:

Cervical cancer affects half a million women annually, with half of those affected passing away from the disease. It is the most common gynaecological malignancy worldwide, and in India, it tends to occur in females of reproductive age, with the first peak appearing between the ages of 33 and 39 and the second peak appearing between the ages of 55 and 60 [1,2]. 90% of cervical cancer fatalities,

according to the World Health Organisation (WHO), occur in underdeveloped nations. In fact, developing nations were home to 85% of all cervical cancer cases in 2016 [2]. Cervical cancer ranks second on the podium of malignancies endangering the health of women in Algeria and Morocco, and third in Tunisia, despite the region's low frequency [3].

Human papillomavirus (HPV) family viruses are the primary cause of cervical cancer. It belongs to the double-stranded circular DNA virus family, which is 8 Kb in size, and has a preference for cutaneous and mucosal epithelia [4,5]. The majority of these viruses are spread sexually, with HPV being the most common STD [2]; nevertheless, cutaneous contamination (intimate skin to skin contact) cannot be ruled out [5,6]

Zhao-jieChen et all a project that intends to statistically construct topotecan hydrochloride-loaded solid lipid nanoparticles (SLNs) in order to circumvent the negative effects of standard pharmacological therapy for cervical cancer. Following that, optimised SLNs with maximal drug loading and suitable particle size were created using a numerical technique based on desirability functions. Studies on the cytotoxicity of cervical cancer cell lines, such as the human squamous cell carcinoma cell line SiHa and the cervical squamous cell carcinoma cell line HeLa, were conducted. The findings indicate that improved SLNs could present a compelling alternative to current cervical cancer treatment offerings.

MonaElhabak et all arestudy that attempts to create and assess hybrid nanoparticles for the efficient intravaginal administration of the cancer drug gemcitabine in rat models of cervical cancer. Chitosan, lecithin, and a surfactant were used in the ionic gelation process to create gemcitabine-loaded hybrid nanoparticles (GEM-HNPs). Particle size (PS), polydispersity index (PDI), zeta potential (ZP), entrapment efficiency (EE), and loading efficiency (% LE) were evaluated in relation to the effects of several factors, including the chitosan/lecithin ratio, the kind of lecithin, and the type/amount of surfactant. The physical shape of a few GEM-HNPs was further assessed using TEM, solid state characterisation, and % drug release. Using confocal laser scanning microscopy, the results are claimed to be in vitro cytotoxicity on Hela cancer cells and in vivo cell uptake. In the treatment of cervical cancer, the effectiveness and safety of intravaginal GEM-HNPs were evaluated.

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