

ANTI CANCER DRUGS
A Project Work Submitted
In Partial Fulfillment of the Requirements
For the Degree of
BACHELOR OF PHARMACY

by
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Under the Supervision of
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to the
Department of Pharmacy
GALGOTIAS UNIVERSITY
Greater Noida
Month, Year
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22.

causes of cancer

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CERTIFICATE

This is to certify that the project work entitled “...PUSHPENDRA”is a bonafide research work done by ...GALGOTIAS UNIVERSITY..... at Department of Pharmacy, School of Medical and Allied Sciences, Galgotias University, Greater Noida,

under the supervision and guidance of...DR. NASAR MALLIK....., Associate Professor, School of Medical and Allied Sciences, Greater Noida. The work is completed and ready for evaluation in partial fulfillment for the award of Bachelor of Pharmacy under Galgotias University, Greater Noida during the academic year 2020-2021.

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This to certify that the project This work entitled “...ANTI CANCER
DRUGS.....” by**GALGOTIAS**

UNIVERSITY..... for the award of “**Bachelor of Pharmacy**” degree, comprises of the bonafide research work done by him/her at Department of Pharmacy, School of Medical & Allied Sciences, Galgotias University, Greater Noida under my guidance and supervision and to my full satisfaction.

Dr. NASAR MALIK

Associate Professor

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(Guide)

DECLARATION

I hereby declare that the project work embodied in this project entitled “**ANTI CANCER DRUGS..**” was carried out by me under the supervision and guidance of DR. NASAR MALLIK, Associate Professor, School of Medical and Allied Sciences, Galgotias University, Greater Noida. I have not submitted the matter embodied in this project or award of any other degree or diploma of any other university or institute.

Date:

Place:

Name and Signature of candidate

Dedication

I dedicate this thesis to my guide, mentor, teacher DR. NASAR MALLIK who taught me everything about this project and mam you also taught me basic rules of life that are very useful and important for a person to live a happy and healthy life. Sir you taught me that never too late to start a thing and to achieve your goals. Mam you and your thoughts really motivates me in my life and my career. So, sir thank you for guiding me.

ABSTRACT

Due to certain limitations relating to its low solubility in water along with poor pharmacokinetics, the implementation of chemotherapy utilizing traditional chemotherapeutics has indeed been hampered, resulting in serious adverse effects as well as patients get resistant to these drugs. Nanocarriers have been designed to

address the problems by enhancing the efficiency of drugs and opening up the age of oncology nano medicine. Despite appealing information derived in preclinical studies, still, several nanodrugs fall petite of its potential whenever evaluated in patients, demonstrating difference among the design of nanopartical or ex 'en its medical translation. This review isintented to ascertain the scope of the nanotherapeutics utilized in oncology. The factors that hinder nano drugs from progressing to clinic have been mentioned, and indeed the attempts that would need to be made to reap the benefits of nano medicine's great potential

INTRODUCTION

Cancer seems to be a deadly disease regarded as the unresisted growth and distribution of cells in the body in abnormal ways. Oncology is perhaps the field of therapeutics dealing with the research, diagnosis, treatment as well as cancer prevention. Cancer might affect humans of all ages, even fetuses, however the probability of certain varieties increases with these.

Tumours develop in the cells, the fundamental unit of life for the body. The body is comprised of many cells. These cells proliferate in a regulated manner to generate more cells as they are needed to maintain a healthy body. They die when cells have become old or damaged, and thus are replaced by new ones. But somehow this organized mechanism sometimes goes wrong. A cell's genetic material [DNA] may get impaired, causing mutations that affect normal growth and division of the cells.

Whenever this actually occurs, cells don't really die when they might but when the body doesn't really need them, new cells do form. The spare cells might develop into a mass of tissue named tumor. Targeted drug delivery is considered an approach where drug and carrier complex, distributes drugs to the targeted cell in a specified way. The targeted drug must reach the targeted cell [with the optimum concentration and also with optimum effect.

Cancer is an abnormal cell growth that results in a lack of separation and even the potential to enter tissues and metastatic that have been independently reproduced in the body. Cancer cells travel through the bloodstream during metastasis, and are transported to various parts of the body where other similar growths are formed. Synthetic treatments are designed for cancer treatment but are not exempt from adverse effects. Chemotherapy as well as radiation therapy seem to be significant medical treatments that are used to regulate early tumor stages but they have severe side effects. Nature has given human beings with a range of diverse sources. The treatment of disseminated cancer has become increasingly aimed at molecular targets derived from studies of the oncogenes and tumor suppressors known to be involved in the development of human cancers (1). This increase in spec

of cancer treatment, from the use of general cytotoxic agents such as nitrogen mustard in the 1940s, to the development of natural-product anticancer agents in the 1960s such as *Vinca* alkaloids and anthracyclines, which are more cytotoxic to cancer cells than normal cells, to the use of specific monoclonal antibodies (2) and immunotoxins (3) targeted to cell surface receptors and specific agents that inactivate kinases in growth-promoting pathways (4), has improved the response rate in cancer and reduced side effects of anticancer treatment but has not yet resulted in cure of the majority of patients with metastatic disease. A study of the mechanism by which cancers elude treatment has yielded a wealth of information about why these therapies fail and is beginning to yield valuable information about primarily plants for drug discovery and development against serious diseases. Traditional herb, as such an efficient cancer treatment system. Medicinal plant drugs are reported to have relatively less toxic or even side effects.

Cancer Therapy

During the last few decades, a wide range of cytotoxic agents was discovered from plants, but very few of these managed to reach clinical use after successfully running through the entire long, selective, expensive and bureaucratic process from their chemical identification to their effectiveness in which has been told by many authors and which are hereinafter counted in a historical, molecular, pharmaceutical and clinical point of view.

2.1.1. Vincristine

Vincristine (**1**) has a non-symmetrical dimeric structure, composed of a two indole-type nucleus linked by a carbon-carbon bond, the vindoline portion and the catharanthine type portion (Figure). In 1963, the Food and Drug Administration (FDA) approved its clinical use to treat cancer. In fact, it was one of the first plant-derived anticancer agents approved by this agency [19]. It is a naturally-occurring alkaloid extracted from the leaves of *Catharanthus roseus* (L.) G. Don (formerly *Vinca rosea* L.) and has been used in chemotherapy in adult, but mainly in pediatric oncology practice against acute lymphoblastic leukemia. Its incorporation in the treatment regime increases the survival rate to eighty percent [28]. It is also

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Figure 1. Chemical structure of the vinca alkaloid vincristine (1), an anticancer natural agent that repress cell growth by altering the microtubular dynamics. The large interest in vincristine contrasts with its low natural occurrence, and consequently, its extraction is very expensive. This situation has stimulated an intense research effort aiming to find promising strategies to increase vincristine (and other vinca alkaloids) production. Selected enzymes' manipulation by genetic engineering to raise the metabolic flow rate toward vincristine and the use of elicitors to activate genes involved in vincristine metabolic pathways are effective strategies to increase the biotechnological production of this compound [30,31]. However, some improvements are needed before these processes become economically viable. Another possibility to obtain more vincristine is the application/optimization of high yield extraction methodologies like negative-pressure cavitation extraction [32]. Vincristine, in a concentration-dependent manner, can affect cells' division. However, the most well-known mechanism of vincristine antitumor activity involves interaction with tubulin, the basic constituent of mitotic spindle microtubules, inhibiting its polymerization and resulting in the suppression of mitosis. Therefore, it disrupts the assembly of the mitotic spindle, which in turn leads to the demise of actively-dividing cells [33]. Some authors report that at the lowest effective concentration, the anti-proliferative effect is due to a subtle change in the addition and

loss of tubulins at the mitotic spindle microtubule and thus stabilizes the mitotic spindle assembly and disassembly processes that lead to metaphase arrest [30]. Once microtubule dynamics, and therefore cell division, can be perturbed by blocking the polymerization or depolymerization of tubulin in microtubules and thus impairing the mitotic spindle assembly, it seems that vincristine can act by both mechanisms depending on the concentration level. Moreover, a molecular docking study showed some evidence suggesting each part of the vincristine dimeric structure exhibits a specific role on its anticancer activity once the vindoline nucleus binds tubulin heterodimers, while the

catharanthine nucleus provides a cytotoxic effect [34].repress cell growth by altering the microtubular The large interest in vincristine contrasts with its low natural occurrence, and consequently, its extraction is very expensive. This situation has stimulated an intense research effort aiming to find

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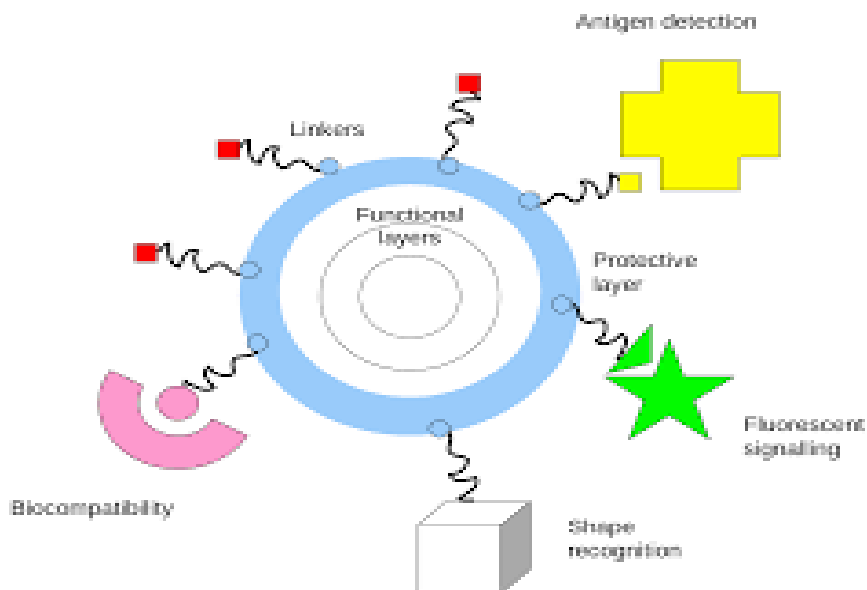
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Nanoparticles

Nanoparticles made of solid particles or colloids having a size range from 10 to 1000 nm, they consist of micro-materials where the drug substance has been dissolved, encapsulated, adsorbed, entrapped, or attached. ^{1 5} Nanospheres have a structural matrix of some kind of monolithic form wherein drug substance can be distributed as well as adsorbed across its surfaces or embodied inside particles. Nanocapsules seem to be the vehicular form where the drug substance remained confined to a compartment comprising of such an internal core of liquid enveloped through a polymer matrix. Here also, the drug substance inside the internal core is primarily dissolved, and may also be adsorbed to that same capsule surface. ^{1 6,7} Apart from this nanoparticles have some following advantages:

A targeted drug can be delivered, protect drug from degradation, reduces side effects, improves bioavailability of the drug, cheaper and stable, provide patient compliance. | 8, 9|



Nanotechnology

Nanotechnology is perhaps the development of nan size assemblies encompassing the drug substance - 10 It is concerned with the study as well as the use structures within that to 100 nm size range. Nanotechnology 'goal would be to make a diagnosis as appropriately or even quickly as promising and also to treat as efficiently as likely deprived of any kind of adverse effects utilizing a targeted as well as controlled approach to delivery of drug. Nanoparticles, nanosuspension, solid lipid nanoparticles, nanocrystals and nano emulsion seems to be an important system for delix'ery of drug developed utilizing the principles of nanotechnology- 11 2 Nanoparticles are the particles of nanosize which transport drug substance to accomplish better or improved pharmacological effects. Utilizing nanotechnology in combination therapies seems to provide synergistic impact in drug delivery.

Benefits of nanoparticle-based drug delivery system

- Therapeutic effectiveness is improved.
- It reduces the adverse effects related to drug by enhancing its pharmacokinetics. It allows drug to circulate in blood for extended duration of time.

➤ 2. Types of infections

Infectious disease is a clinically obvious disorder resulting from the presence of a pathogenic agent which can either be a virus, bacterium, fungus or parasite. These diseases are also called communicable diseases due to their ability to get transferred from one person to another (malaria, tuberculosis) and also sometimes from one species to another (flu, influenza). Infectious diseases can be vastly classified as: 1) known diseases which are insidiously there (e.g., dengue, malaria, tuberculosis); 2) new, previously unknown diseases (e.g., severe acute respiratory syndrome); and 3) diseases which threaten to emerge in the near future (e.g., avian influenza).



Hemotherapy Cancer Therapy
Therapy (interferons - Incr. prod. T-
cells and B cells

•Immunologican

•Chemotherapy

•Alkylation Agents

•Antimetabolites / Nucleoside Analogs

•Antibiotics

•Antimitotic Agents

•Miscellaneous Antineoplastic Agents

•Hormonal Therapy •Chemotherapy

•Alkylation Agents ✓

•Antimetabolites / Nucleoside Analogs

•Antibiotics ✓

•Antimitotic Agents ✓

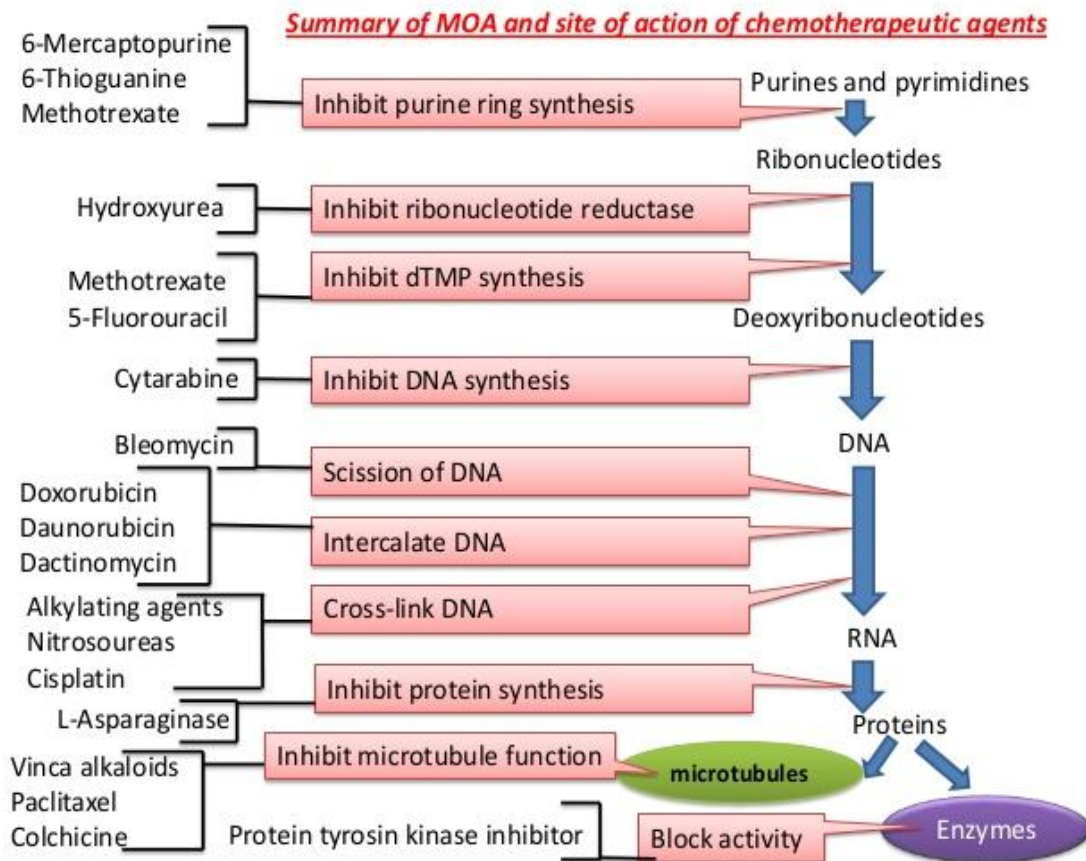
•Miscellaneous Antineoplastic Agents

- Hormonal Therapy
- Hydroxyurea •Podophyllotoxines
- Camptothecins
- Compounds for photodynamic therapy
- Tyrosine-Kinase Inhibitors



Chemotherapy

- Alkylation Agents
- Antimetabolite Nucleoside Analogs
- Antibiotics Antimitotic Agents
- Micellaneous Antineoplastic Agents
- Hormonal Therapy



Radiation

The radiations are however infamous carcinogens in developed and emerging nations. The incidence of about 10 percent of cancer is due to the influence of radiation, both ionizing as well as non-

ionizing Radioactive compounds, ultraviolet I UV , and pulsed electromagnetic fields are the primary sources of radiation.

Herbal drug Treatment Anticancer Plants *Acronychia Baueri*: Utilizing a differential extraction technique for the examination of the bark of the Australian plant *Acronychia Baueri* Schott (*Bauerella australiana* Borzi), has resulted in the isolation of the triterpene lupeol and the alkaloids melicopine, acronycine, and normelicopidine. The experimental anti tumor activity associated with the crude alkaloidal mixture obtained from the ether extract has been shown to be attributable to acronycine. Experimental evidence is herein given, showing acronycine to have the broadest antitumor spectrum of any alkaloid isolated to date in these laboratories. By virtue of its being chemically unrelated to any of the presently utilized antitumor agents it represents a new lead in the search for agents effective in the chemotherapeutic management of human neoplasms.⁷ Garlic (*Allium sativum* L.) has a long history of being as a food having a unique taste and odor along with some medicinal qualities. Modern scientific research has revealed that the wide variety of dietary and medicinal functions of garlic can be attributed to the sulfur compounds present in or generated from garlic. Although garlic produces more than 20 kinds of sulfide compounds from a few sulfur containing amino acids, their functions are different from one another; e.g., allicin, methyl allyl trisulfide, and diallyl trisulfide have antibacterial, antithrombotic, and anticancer activities, respectively.⁸ Garlic [*Allium sativum*] is among the oldest of all cultivated plants. It has been used as a medicinal agent for thousands of years. It is a remarkable plant, which has multiple beneficial

effects such as antimicrobial, antithrombotic, hypolipidemic, antiarthritic, hypoglycemic and antitumor activity. A number of studies have demonstrated the chemopreventive activity of garlic by using different garlic preparations including fresh garlic extract, aged garlic, garlic oil and a number of organosulfur compounds derived from garlic. The chemopreventive activity has been attributed to the presence of organosulfur compounds in garlic. However it not understood, but several mode of action this is achieved is not fully understood, but several modes of action have been proposed. These include its effect on drug metabolizing enzymes, antioxidant properties and

tumor growth inhibition. Most of these studies were carried out in the animal models. Also, recent research has been focused on the antimutagenic activity of garlic. Recently, it has been observed that aged garlic extract, but not the fresh garlic extract, exhibited free radical scavenging activity. The two major compounds in aged garlic, S-allylcysteine and S-allylmercapto-L- cysteine, which has had the highest radical

➤ **Facts about Cancer**

Cancers rank amongst world's foremost reasons of mortality or even morbidity with around 14 million reported cases and 8.2 million deaths in the year. During the next 2 decades, the new cases are projected to increase by around 70%. Among the men, prostate, lung, stomach, and liver cancer were the few most mutual tumor sites identified in 2012. Breast, lung, colorectal, cervix, as well as gastric cancer seems to be some of the five most mutual sites diagnosed among females. The 5 leading behavioral as well as dietary risks result in cancer deaths: high BMI, less intake of vegetables and fruits, insufficient physical activity, use of tobacco, alcohol consumption. Tobacco consumption is perhaps the most significant cause of cancer contributing about 20 per cent of global deaths from cancer and about 70 per cent of global deaths from lung cancer.

Cancer that causes viral infections comprising HBV as well as HPV account for cancer deaths of approximately 20% in low- or even middle-income countries. In Asia, Africa, and Central and South America, many as 60 percent of global's total new annual cases happen. Such regions account for 70 per cent of deaths from cancer in the world. Annual cases of cancer are predictable to upsurge from 14 million in 2012 to over 22 million in the next two decades.

Table 1: Types of Cancer

Type	Site of cancer
Adenomas	Thyroid, adrenal gland, pituitary gland, and x 'various Added glandular tissues.
Carcinomas	Cells which shield internal as well as external body parts such like breast Jung, or even colon cancer
Sarcoma	Bone, fat ,connective tissue, muscle, cartilage, or ex 'en other supportive tissues
Lymphomas	Lymphatic needs as well as tissues of immune system.
Leukemia	Bone marrow frequently amount p in the bloodstream.

Bladder cancer .

- ❖ **Breast cancer .**
- ❖ Colorectal Cancer.
- ❖ Kidney Cancer.
- ❖ Lung Cancer - Non-Small Cell.
- ❖ **Lymphoma - Non-Hodgkin .**
- ❖ Melanoma.
- ❖ Oral and Oropharyngeal Cancer.

Sign and Symptoms

You should know certain signs as well as cancer symptoms. But note, possessing any of these doesn't indicate you have cancer — these signs and symptoms cause many other problems too.

- Impenetrable
- weight loss

Many people use the words 'sign' and 'symptom' interchangeably. However, there are important differences that affect their use in the field of medicine.

Any objective evidence of a disease, such as a skin rash or a cough, is a sign. A doctor, family members, and the individual experiencing the signs can identify these.

However, less obvious breaks in normal function, such as stomachache, lower [back pain](#), and [fatigue](#), are symptoms and can only be recognized by the person experiencing them. Symptoms are subjective, meaning that other people only know about them if informed by the individual with the condition.

This *MNT Knowledge Center* article will look at the implications of signs and symptoms as well as their history. The piece will also introduce the different types of sign and symptom and their uses in medicine.

Fast facts on signs and symptoms

- A light [headache](#) can only ever be a symptom because no one else can observe it.
- Medical symptoms are split into chronic, relapsing, and remitting.
- An example of a medical sign is [high blood pressure](#), as it can be measured and observed by another person.
- Anthony van Leuwenhoek invented the microscope in 1674, forever changing the face of diagnostic tools.
 - Fatigue
 - Pain in body
 - parts Changes
 - in skin
 - Variation in bowel habits as well as bladder
 - functioning Wound which do not reconc

-
- White patches in the oral cavity or white spots
 - around the tongue Uncommon bleeding or even
 - discharge
 - Fresh change in a mole or wart or any new
 - change in the skin Nagging cough
 - Breathlessness
 - Unexplained
 - vaginal bleeding
 - Persistent heart
 - burn
 - Croaky voice
 - or hoarseness
 - Prolonged
 - bloating
 - Trouble in
 - falling
 - Ulcers in oral cavity that
 - will not heal Heavy
 - sweating at night
 - Unfamiliar changes in the
 - breast

➤ **Diagnosis**

if you experience a complaint, or your test result suggests cancer, the doctor may need to figure out whether it has been triggered by cancer or any other cause. The doctor may recommend reviewing your medical records as well as family, and perhaps do a physical examination. The health care provider may indeed order laboratory tests, scans, or several other tests and perhaps even procedures.

➤ **Factors**

Influen

Cancer

Age:

Cancer most often occurs in the elderly; in people 55 years of age or older, 78 per cent of all cancer diagnoses occur. Anyone can develop cancer. However, the risk of being diagnosed with cancer increases significantly with age.

Obesity and Physical activity

Overweight and insufficient physical activity, has been linked with an increased risk at different cancer sites like breast and endometrial cancer - 114

Tobacco and Smoking

Tobacco consumption seems to be the number one cause of cancers. Daily usage tobacco by smoking, snuffing, chewing, which really is liable for incidences of cancer in men and women from 65 to 85 per cent respectively - 113

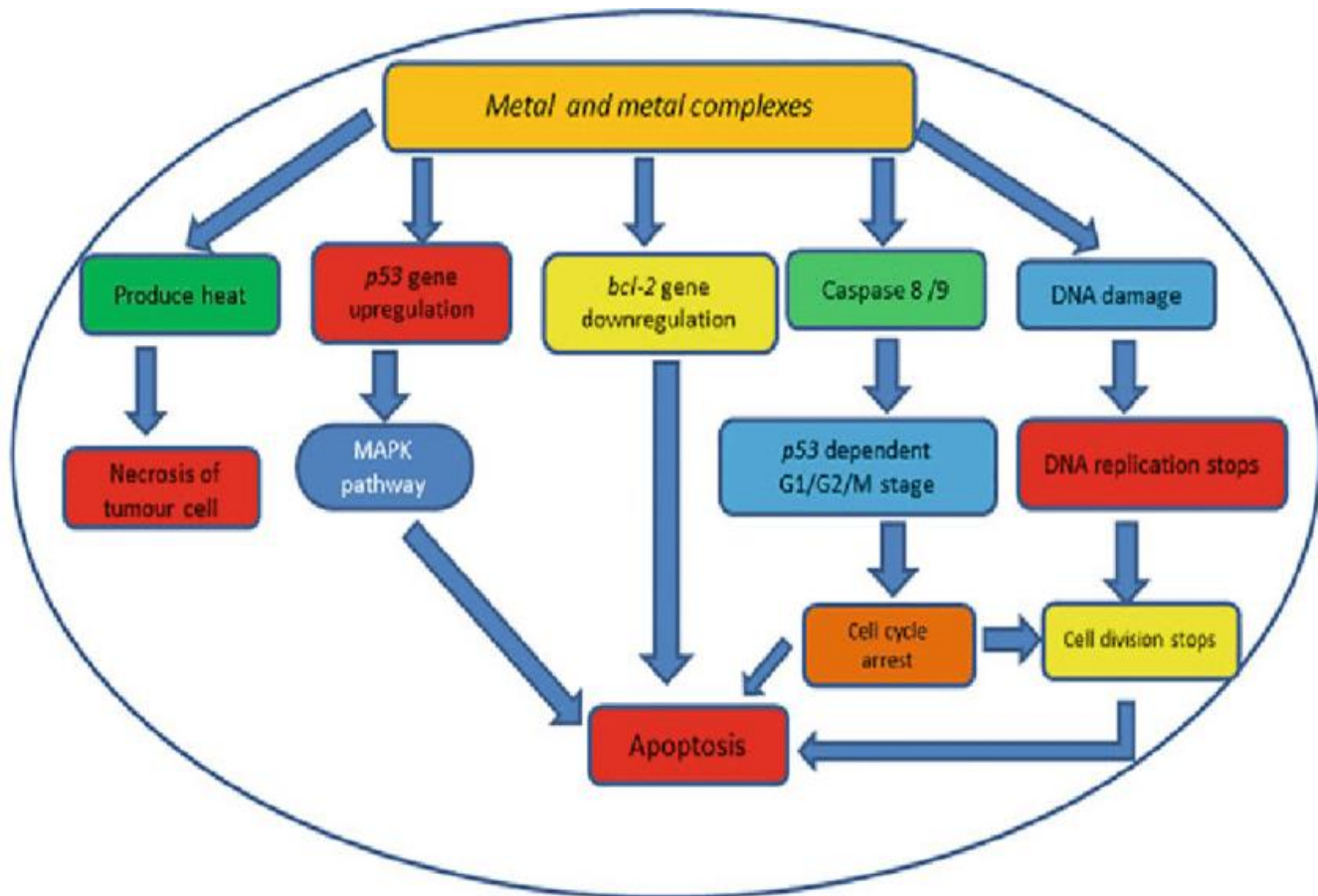
Alcohol consumption

Consumption of alcohol has indeed been considered amongst the foremost reasons of colorectal cancer according to a new WHO monograph. Every year, around 9.4 per cent of new cases of colorectal cancer are ascribed globally to alcohol consumption. 113

Radiation

The radiations are however infamous carcinogens in developed and emerging nations. The incidence of about 10 percent of cancer is due to the influence of radiation, both ionizing as well as non-ionizing.

Radioactive compounds, ultraviolet [UV], and pulsed electromagnetic fields are the primary sources of radiation.1 13



Plant source of anti-cancer drugs

Compounds derivative from plant, are among important foundation of clinical y beneficial anti- cancer drug, hasmade known to have probable for prevention and procurement of cancer in human being. In prophylaxis of cancer, plant sourceshas a long times gone by; more than over 3000 species of plant seemed to beinformed by Hartwell that are being used in procurement of cancer- 1 7 j Plants and alsocompounds derived from planthave frolickedsubstantialpartint he progress of a total of medically used anticancerdrugs.

Chemotherapy, which is a major treatment being used manage advanced malignanc y stages and also as per a prophylactic toward potential metastasis, exemplifies severe toxicit y on healthy tissue. Plants are often utilized to treat diverse human and animal diseases. They preserve people's health or even vitality and furthermore cure diseases without causing toxicit y including cancer. More than 50 percent of all standard medicine are naturally occurring prrxlucts, most of which have the potential to direct cancer cells -113

content Introduction 2. Plant-Derived Anticancer Agents in Clinical Use (Figure 1) 3. Plant-Derived Anticancer Agents in Clinical Development (Figure 2) 4. Targeted Natural Products 5. Plant-Derived Antitumor Agents in Preclinical Development (Figure 3) 6. Cell Cycle Target Inhibition and Anticancer Drug Discovery 7. Conclusions Glossary Bibliography Biographical Sketches To cite this chapter Summary Plant-derived compounds have played an important role in the development of several clinically useful anti-cancer agents. These include vinblastine, vincristine, the camptothecin derivatives, topotecan and irinotecan, etoposide, derived from epipodophyllotoxin, and paclitaxel (taxol®). Several promising new agents are in clinical development based on selective activity against cancer-related molecular targets, including flavopiridol and combretastin A4 phosphate, and some agents which failed in earlier clinical studies are stimulating

Effect of aging on pharmacokinetics properties of drug

Various physiological parameters change with advancing age, that would substantially influence the pharmacokinetics of chemotherapeutics. In elderly patients, the pharmacokinetics profile may be impacted by altering constraints of distribution, metabolism as well as elimination, whereas the alterations in absorption have very seldom prompted to differences that are clinically significant. Variations in stomach pH might just have inconstant effects mostly on uptake of anticancer drugs, while the uptake of Class 11 oral therapies, together with endocrine agents or even tyrosine kinase inhibitors, rises with elevated pH of gastric. Additional instance is capecitabine, which is having better absorption in older patients with elevated pH of gastric, equivalent to higher absorption mostly in fed as opposed to that of the fasted condition. Such highly complex and dynamic adjustments significantly change the overall effect of age upon this pharmacokinetic profile of some kind of explicit medication offered to elderly patients having breast cancer. In addition to these physiological responses, many additional aspects play a significant role of the elderly patient's treatment with anticancer drugs. First, older patients often have multiple chronic conditions and seek co-medication which might have a detrimental effect on treatment for anticancer. For example, while receiving adjuvant chemotherapy for breast cancer, patients with diabetes mellitus experienced the most chemotherapy-related adverse events relative to non-diabetic older patients, a higher percentage of fat may lead to impaired drug disposition and increases toxicity from different chemotherapy treatments. In addition, comorbidities had been ascertained to have a significant influence on mortality rates in older patients with cancer diagnoses.

S . N o .	Name of plant	Family	Chemical responsible anticancer activities
1	Turmeric	Zingiberaceae	Curcumin
2	Vinca	Apocynaceae	Vinblastine, Vincristine, Vinorelbine, and Vindesine
3	Wheat grass	Grasses	Chlorophyll, Selenium Lactrile
4	Neem	Meliaceae	Flavonoids IRutin Quercetin j
5	Taxus	Taxaceae	Paclitaxel, Taxol
6	Aloe vera	Xanthorrhoeaceae	Aloeemodin, Erncdin

Table 2: List of Plants from which Anticancer drugs are derived

➤ *Plants*

Camptotheca acuminata

The cancer treatment drug [topotecan](#) is a synthetic chemical compound similar in chemical structure to [camptothecin](#) which is found in extracts of [Camptotheca](#) (happy tree).^[7]

Catharanthus roseus

[Vinca alkaloids](#) were originally manufactured by extracting them from [Catharanthus](#) (Madagascar Periwinkle).^[1]

Podophyllum spp.

Two chemotherapy drugs, [etoposide](#) and [teniposide](#), are synthetic chemical compounds similar in chemical structure to the toxin [podophyllotoxin](#) which is found in [Podophyllum peltatum](#) (May Apple).^[1]

Taxus brevifolia

Chemicals extracted from clippings of [Taxus brevifolia](#) (Pacific yew) have been used as the basis for two chemotherapy drugs, [docetaxel](#) and [paclitaxel](#).^[8]

Euphorbia peplus

[Maytenus ovatus](#) Herbal medicine Contains [ingenol mebutate](#) (Picato) which is used to treat skin cancer.^[9]

❖ [Experimental cancer treatments](#)

❖

❖ [Chemotherapy regimens](#)

❖ [National Comprehensive Cancer Network](#)

❖ [Alternative cancer treatments](#)

List of Some Anticancer Drugs

Drug	Pharmacological function
Aspirin	Analgesic, anti-inflammatory
Atropine	Pupil dilation
Bromelain	Anti-inflammatory
Colchicine	Anticancer
Digitoxin	Cardiotonic
Ginkgolides	Brain disorders
Harpogoside	Rheumatism
Hyoscyamine	Anti-cholinergic
Morphine	Analgesic
Podophyllotoxin	Anticancer
Quinine	Antimalarial
Reserpine	Anti-hypertensive
Salicin	Analgesic
Silymarin	Antihepatotoxic
Sitosterol	Prostate hyperplasia
Taxol	Anticancer
Vincristine and vinblastine	Anticancer
Tubocurarine	Mascular relaxation

Anticancer drugs

Doxorubicin, Daunorubicin,
Vinblastine, Vincristine, Actinomycin
D, Paclitaxel, Teniposide, Etoposide

HIV protease inhibitors

Amprenavir, Indinavir, Nelfinavir,
Ritonavir, Saquinavir

Immunosuppressive drugs

Cyclosporin A

Cardiac drugs

Digoxin, Quinidine

Anti-emetic

Ondansetron

Lipid-lowering agent

Lovastatin

Antihistaminic

Terfenadine

Steroids

Aldosterone, Hydrocortisone, Cortisol, Corticosterone, Dexamethasone

Antidiarrhoeal agent

Loperamide

Anti-gout agent

Colchicine

Antibiotic

Erythromycin

Anti-helminthic agent

Ivermectin

Anti-tuberculous agent

Rifampin

Fluorescent dye

Rhodamine-123

Dopamine antagonist

Domperidone

1. Docetaxel
 - 1.1 Paclitaxel
2. Anthracyclines
 - 2.1 .Doxorubicin
 - 2.2 Epirubicin
3. AlkylatingAgents

AnticancerActivities of Medicinal Plants

With successful clinical trials drugs being developed from plant origins are popular for clinical development. Their non-toxic effects on normal cells and their cytotoxic effects on cancer cells put them in high demand. A lot of the species investigated are selected from developing countries in Africa and Asia where herbal therapies are practiced and medicinal plants are relied upon for primary treatment ^{1,4-8}. The World Health Organisation estimated in 2007 that the plant-derived drugs trade was worth US\$100 billion. The trade is expected to reach US\$5 trillion by 2050 ¹³.

There is a huge demand for medicinal plants in developing countries putting high pressure on the plant populations. Many medicinal plants are cultivated from wild populations for informal trade but this cultivation is not regulated ⁴⁴. With rapid population growth, deforestation and increasing urbanisation the protection of medicinal plants is becoming an issue in need of addressing ⁴⁵. With constant increase in demand, high-value medicinal plants are threatened by extinction if over exploitation continues. Conservation of these plants is vital. When wild medicinal plants are harvested only specific parts of the plant are used in treatment such as the bark of a tree or bulbs and tubers from bulbous and tuberous plants. Extracting only segments of a plant may damage and reduce its survival ⁴⁴. To increase the sustainability of medicinal plants in developing countries, utilization of all plant parts including the stem, leaf, root and bark should be included in the treatment. Other methods of conservation include germplasm conservation; storing viable seeds, cryopreservation; preserving biological material in liquid nitrogen and tissue culture; propagates plants in sterile conditions and can produce mature plants clones quickly of

rare species [45-46](#). These preservation methods will also allow for industrial utilization in developed countries [45](#).

In developed areas such as Europe and parts of India and China some medicinal plants are being cultivated on a large scale to keep up with increasing demands for alternative natural drugs [44](#). Cultivating sustainable species may release pressure on other wild species and prevent loss of plant biodiversity. However, mass cultivation could lead to strain on land available for other resources in agriculture.

Attention is being drawn towards foods with medicinal properties, such foods include cruciferous vegetables and fruit berries [21,29](#). Raw by-products from industries could be utilized to extract anticancer agents from sources possess these agents. For example, one of the biggest crops grown globally are grapes (*Vitis vinifera*) and 'grape seed extract' is often added in ingredients of food products due to its human health benefits. In the winery industry grape stems are a raw by-product of wine making. This high organic load can be acidic to the environment surrounding the winery. However, its high polyphenolic content may make it advantageous for anticancer drug development and make a profitable scheme to solve environmental issues. Grape stem extracts have demonstrated to have antioxidant properties, prevent DNA damage from reactive oxygen species and shown anti-carcinogenic potential against an array of cancer cell lines from cervical cancer, thyroid cancer and many more [47-48](#).

3.1 . Cyclophosphamide

4. Vinca-Alkaloids

4.1 .Vinorelbine

Intravenous Vinorelbine

Oral

5. Anti-Metabolites

5.1. 5-Fluorouracil

5.2 Capecitabine

CONCLUSION:

Cancer which is the succeeding reason of death after cardiovascular disease. Cancer seems to be the uncontrolled cell growth of the our body which leads to death. For treatment of cancer there are very synthetic compounds are present but they have many adverse effects as compared to medicinal plants that have anticancer activity. Medicinal plants that have anticancer activity has role in treatment as well as chemopreventive purpose for cancer. Some medicinal plants like turmeric, vinca, taxus, neem, aloe vera, broccoli, etc that have chemical constituents as curcumin, vincristine, vinblastine, taxol and various anticancer classes of constituents like vitamins, flavonoids, phenolic compounds, anthraquinones, carotenoids, diterpenoids, tannins, saponins and other miscellaneous compounds have their important role in treatment and in prevention of cancer. Several therapeutic procedures are available for the treatment of cancer, and in most cases, undesirable side effects (gastrointestinal disorders, kidney damage, and other complications) are associated with them. These compounds include alkaloids, phenol compounds, and monoterpenes. In addition to these, indicators such as vinblastine, vincristine, curcumin, Taxol,

boswellic acid, and umbelliprenin and compounds such as quercetin, catechin, cucurbitacin, kaempferol, thymol, carvacrol, 1 and 1,8-cineole, α -pinene, myrcene, and β -sitosterol have anticancer effects. These compounds have antioxidant, antiangiogenesis in tumor cells, and its anticancer effects are new and more properties, and inhibition of damage to DNA, cell cycle. Failure of a patient's cancer to respond to a specific therapy can result from one of two general causes: host factors and specific genetic or epigenetic alterations in the cancer cells. Host factors include poor absorption or rapid metabolism of a drug, resulting in low serum levels; poor tolerance to effects of a drug, especially in elderly patients, resulting in a need to reduce doses below optimal levels; inability to deliver a drug to the site of a tumor, as could occur with bulky tumors or with biological agents of high molecular weight and low tissue penetration such as monoclonal antibodies and immunotoxins (5); and various alterations in the host-tumor environment that affect response of the tumor including local metabolism of a drug by nontumor cells, unusual features of the tumor blood supply that may affect transit time of drugs within tumors and the way in which cells in a cancer interact with each other and with interstitial cells from the host (6), and asadhya pradara (intractable

arrest (especially at the G2/M), induction of apoptosis, inhibition of effective.

HOW DO CANCER CELLS ELUDE CHEMOTHERAPY

Cure: In some cases, the treatment can destroy cancer cells to the point that your doctor can no longer detect them in your body. After that, the best outcome is that they never grow back again, but that doesn't always happen. **Control:** In some cases, it may only be able to keep cancer from spreading to other parts of your body or slow the growth of cancer tumors.

How is chemotherapy used?

Sometimes, it treats cancer by itself, but more often it's used in combination with:

- **Surgery:** A doctor removes cancerous tumors or tissue, or organs contaminated with cancerous cells.
- **Radiation therapy:** A doctor uses invisible radioactive particles to kill cancer cells. It may be delivered by a special machine that bombards parts of your body from the outside, or by putting radioactive material on, near, and even inside your body.

Biological therapy: Living material in the form of bacteria, vaccines, or antibodies are carefully introduced to kill cancer cells. How long does chemotherapy last?

➤ That depends on:

- The type of cancer you have
- How far along it is
- The goal of treatment: cure, control growth, or ease pain
- The type of chemotherapy
- The way your body responds to the treatment

You may have chemotherapy in “cycles,” which means a period of treatment and then a period of rest. For example, a 4-week cycle may be 1 week of treatment and then 3 weeks of rest. The rest allows your body to make new healthy cells. Once a cycle has been planned out, it’s better not to skip a treatment, but your doctor may suggest it if side effects are serious. Then your medical team will likely plan a new cycle to help you get back on track.

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