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Summary Of The Main Classes Of Naturopathic Anticancer Medications

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ABSTRACT: Plant-based anticancer drugs have played a crucial role in cancer treatment for many years. According to Ayurveda, various cancer phases are intractable, chronic inflammatory disorders. Natural products have high potential for the prevention and treatment of different cancers. More importantly, anticancer naturopathic have been modified to gain first-line, second line, and third-line targeting in tumor tissues. This review will explore 25 plant-based anticancer drugs, their mechanisms of action, marketed products, side effects, and relevant references.

INTRODUCTION: - For many years, anticancer medications derived from plants have been essential to the treatment of cancer. These medications come from a variety of plant species and target a number of carcinogenic processes, including angiogenesis, DNA synthesis, cell cycle control, and apoptosis. The mechanisms of action, marketed products, adverse effects, and pertinent references of 25 plant-based anticancer medications will all be included in this review.

Almost any organ or tissue in the body can develop a variety of diseases, including cancer, when abnormal cells proliferate uncontrollably, migrate to different organs, or transcend normal boundaries to enter other parts of the body. One of the main reasons for cancer-related mortality is the latter stage, called metastasis. The most important problem in cancer pathology is the differentiation between benign and malignant tumors. More than a hundred distinct forms of cancer exist, and each one behaves differently and reacts differently to treatment. Any of the different cell types in the body might proliferate abnormally and lead to cancer.1, 2

TYPES OF CANCER: - Common skin warts and other benign tumors remain where they are and do not spread to other body areas. Contaminating normal tissue nearby. However, a malignant Tumor may also spread to other areas of the body (metastasis) by invading adjacent healthy tissue and traveling via the lymphatic or circulatory systems. "Cancer" should only be used to refer to malignant tumors, and the risk of developing cancer is derived from its ability to spread and penetrate. While benign tumors may usually be surgically removed, malignant tumors are frequently resistant to such localized treatment because they spread to distant body locations 3.

Cancer comes in a wide variety of forms, each with its own distinct location within the body, cell type of origin, and genetic characteristics. The genes that underpin the growth of cancer cells and their behaviour are incredibly intricate. While certain cancer genes are more unique to a specific type of cancer, others are commonly found in multiple cancer forms.

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underpin the growth of cancer cells and their behavior are incredibly intricate. While certain cancer genes are more unique to a specific type of cancer, others are commonly found in multiple cancer forms.

Commonly found in multiple cancer forms. Furthermore, it has been shown that the genetic profiles of primary and metastatic tumors, as well as even of individual tumors, commonly change due to branching evolution 4.

Tumors are classified as benign or malignant based on the type of cell they come from. The three main categories that make up the most malignancies, including sarcomas, carcinomas, and leukemias or lymphomas.

Carcinomas, or malignancies of the epithelial cells, account for around 90% of all human cancers. Solid tumors of Sarcomas are uncommon in humans and can occur in connective tissues such as muscle, bone, cartilage, and fibrous tissue.

Sarcomas are solid tumors of connective tissues, such as fibrous tissue, cartilage, muscle, and bone. Unusual in people. Leukaemia's account for about 8% of all human cancers, whereas lymphomas are brought on by immune system cells and blood-forming cells, respectively.

The kind of cell involved and the tissue of origin (e.g., lung or breast carcinomas) are used to further classify tumors; for instance, fibroblasts give rise to fibro sarcomas, while erythrocyte (red blood cell) precursors give rise to elytroid leukaemia 5.

Etiology: As alternative causes of cancer, genetic and environmental factors have been suggested over time. A change that disrupts the natural According to genetic theory, cancer cells originate from mechanisms that regulate normal cell development and survival. However, the environmental theory suggests that a number of external variables that interfere with normal tissue homeostasis 6 may cause cancer instead of mutations.

Different stages of cancer are intractable, chronic inflammatory illnesses, according to Ayurveda. There is strong evidence that there is a connection between age and conditions linked to a person's lifestyle, such as cancer, metabolic syndrome, and chronic inflammation. Furthermore, there is evidence that the inflammatory environment inside and around tumors plays a crucial role in the development of cancer. The molecular underpinnings of the association between inflammation and cancer have only lately been clarified 7.

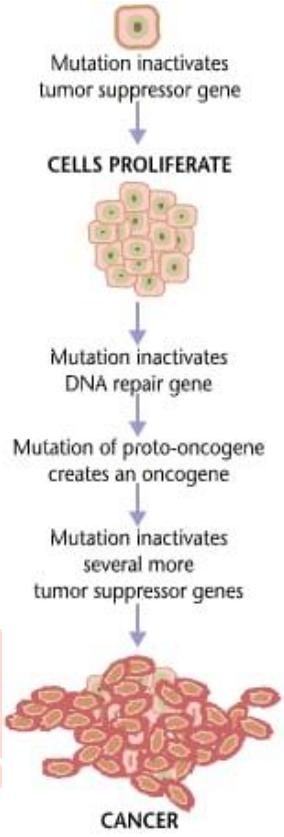

Fig.1.

The Background of Plant-Based Anti-Cancer Medicines:

One of the most serious health issues that humanity is currently dealing with is cancer, a horrifying disease. It calls for a proactive approach to care. Plants include novel chemical substances that present a viable option for cancer research. Despite its effectiveness, chemotherapy has a few unmanageable side effects. However, plants and plant-derived products are a transforming sector 8 because they are easy, safer, ecologically friendly, affordable, rapid, and less toxic than standard treatment methods.

The pleiotropic effects of phytochemicals on target events in a number of ways make them attractive candidates for the development of anticancer drugs. Medications.

The use of herbal remedies as a supplemental or alternative treatment has been widely accepted in the field of oncology. Consequently, a number

every year, a number of novel cytotoxic compounds are discovered in plants, creating new opportunities in the

fight against cancer. Many academics are interested in studying naturally occurring molecular entities that may have applications in the pharmaceutical industry. People that discover compounds with anticancer properties in preclinical studies often strive for clinical efficacy confirmation 9.

Vincristine:

Plant Origin: derived from Madagascar periwinkle, or Catharanthus roseus, which has therapeutic qualities, especially in the fight against cancer. Treatments 10.
A review of the pharmacological activity of Catharanthus roseus was conducted by Gajalakshmi S, Vijayalakshmi S, and Devi Rajeswari V. Int J Pharm Bio Sci. 4(2), 2013: 431–439**.**

Mechanism of Action:

A vinca alkaloid called vincristine binds to tubulin, a protein necessary for microtubule function, to produce its anticancer effects. Creation. Vincristine stops the creation of the mitotic spindle by interfering with microtubule assembly, which results in cell cycle arrest during the metaphase stage. In the end, this disruption causes cancer cells to undergo programmed cell death, or apoptosis.

Types of Cancer Treated: Vincristine works well against a number of tumors, such as:
o acute leukaemia, particularly in **youngsters,**
Hodgkin's and non-Hodgkin's **lymphomas,**
neuroblastoma,

- And Wilms tumor 12
- Are among them.

Advertised Products: Eli Lilly's Oncovin is a well-known product that is advertised. Usually, it is given intravenously in conjunction with 13 chemotherapy schedules.

Neurotoxicity: A typical and dose-limiting adverse effect that manifests as muscle weakness, tingling, and numbness is peripheral neuropathy.
Especially in the hands and feet.

Bone Marrow Suppression:
Reduced generation of blood cells due to bone marrow suppression raises the risk of infection.

Disorders of the Gastrointestinal System:
Abdominal pain, constipation, nausea, and vomiting are typical.
Vincristine is a crucial component of both adult and pediatric oncology, as it is frequently used in combination chemotherapy regimens. Because it is neurotoxic effects, cautious dose changes, and side effect monitoring are crucial throughout therapy 14.

Types of Cancer Treated: Paclitaxel is frequently used to treat a number of cancers, such as
Ovarian cancer.
Breast Cancer
Lung cancer that is not small cell
Cancers of the Head and Neck
Additionally, it is being investigated for a wider variety of solid tumors in conjunction with other medicines. 17
Products Sold: Bristol-Myers-Squibb's Taxol, which is given intravenously, is the main commercial formulation. The medication is frequently used with additional chemotherapy drugs to increase effectiveness 18.

Side Effects: A number of typical side effects are linked to paclitaxel 19:

Neutropenia: A decrease in neutrophils that raises the risk of infection.

Peripheral neuropathy is characterized by nerve injury that causes tingling or numbness in the extremities.

Myelosuppression: Reduced generation of blood cells due to inhibition of bone marrow function.

Alopecia: One major side effect of many chemotherapy treatments is hair loss. Fatigue, nausea, and hypersensitivity reactions are possible additional adverse effects.

Vinblastine:

Plant Origin: The plant Catharanthus roseus, also referred to as Madagascar periwinkle, is the source of vinblastine (20).

Mechanism of Action: Vinblastine inhibits spindle development by binding to tubulin and interfering with microtubule assembly, just like vincristine does. Apoptosis, or cell death, is the result of this event, which stops the cell cycle at the metaphase stage 21.

Types of Cancer Treated: Vinblastine is used to treat a number of malignancies, including 22:
Hodgkin's disease
Cancer of the Testicles
Kaposi's Sarcoma

Marketed Products: Bristol-Myers Squibb's Velban, an injectable medication, is one of the main commercial formulations 23.
Side Effects: Vinblastine has a number of negative side effects, such as 24.

The suppression of bone marrow: decrease in the synthesis of blood cells, which raises the risk of infection and anemia cell production, which can lead to anemia and increased infection risk.
Cell production, which can lead to anemia and increased infection risk

Neurotoxicity: When nerves are damaged, it frequently shows up as tingling or numbness.

Nausea: One frequent gastrointestinal side effect of chemotherapy is nausea.

Plant Origin: The Chinese natural tree Camptotheca acuminata is the source of camptothecin. The chemical was first separated from this plant 25's bark.

Mechanism of Action:
Inhibiting topoisomerase I, an enzyme that reduces torsional strain during DNA replication, is how camptothecin works. Camptothecin inhibits the relegation of DNA strands after they have been cut by attaching to the topoisomerase IDNA complex. This results in the accumulation of DNA breaks and subsequent cell death 26.

Types of Cancer Treated: Derivatives of camptothecin, including topotecan (Hycamtin) and irinotecan (CPT-11), are used to treat a variety of malignancies, such as 27, 28:
Ovarian Cancer
Colorectal cancer
Lung Cancer with Small Cells

Marketed Products:
CPT-11 (Irinotecan):
Hycamtin (Topotecan): In clinical practice, these compounds are frequently employed to treat particular malignancies 29, 30.
Side Effects: The following are typical adverse effects of camptothecin derivatives: 31, 32
particularly while using irinotecan, diarrhea is frequently severe and dose-limiting.

Neutropia: A reduction in white blood cells that raises the risk of infection is known as neutropenia.

Alopecia: One of the most frequent side effects of chemotherapy is hair loss.

Taxotere:
Plant Origin: Taxotere comes from the European yew tree, Taxus baccata, which naturally produces docetaxel, the active component of Taxotere 33.

Mechanism of Action: By attaching to tubulin and stopping its disintegration, Taxotere (docetaxel), like paclitaxel, stabilizes microtubules. Cell division is inhibited as a result of this stability, which stops the dynamic processes of microtubule production and depolymerization. The consequent mitotic arrest encourages programmed cell death, or apoptosis 34.
Types of Cancer Treated: Taxotere is used to treat a number of malignancies, such as 35, 36:
Breast Cancer
Prostate cancer
Lung cancer that is not small cell

Marketed Products: Sanofi's Taxotere, which comes in an intravenous formulation 37, is the main product marketed for docetaxel.

Adverse Reactions: 38 are typical adverse effects linked to Taxotere:

Neutropenia: A substantial decrease in neutrophils that raises the possibility of infection.

Mucositis: Ulceration and inflammation of the mucosal lining, especially in the digestive tract and mouth.

Fluid Retention: This frequently results in peripheral edema.
Similar to paclitaxel, peripheral neuropathy is numbness or tingling brought on by damage to the nerves.

Topotecan:
Origin of the Plant: The Chinese native plant Camptotheca acuminata is the source of topotecan. Originally isolated from the plant's bark, the chemical is a derivative of camptothecin 39.

Mechanism of action: By attaching itself to the topoisomerase IDNA complex, topotecan inhibits

topoisomerase I, an enzyme that reduces torsional strain during DNA replication. This stops single-strand DNA breaks from re-ligating, which causes a build-up of double-strand DNA breaks and ultimately results in cell death 40.

Cancer Types Treated: Topotecan is mainly used to treat 41, 42:

- **Ovarian Cancer**:
- **Small Cell Lung Cancer:**
  After first-line treatments fail, it is frequently used as a second-line therapy in small cell lung cancer.

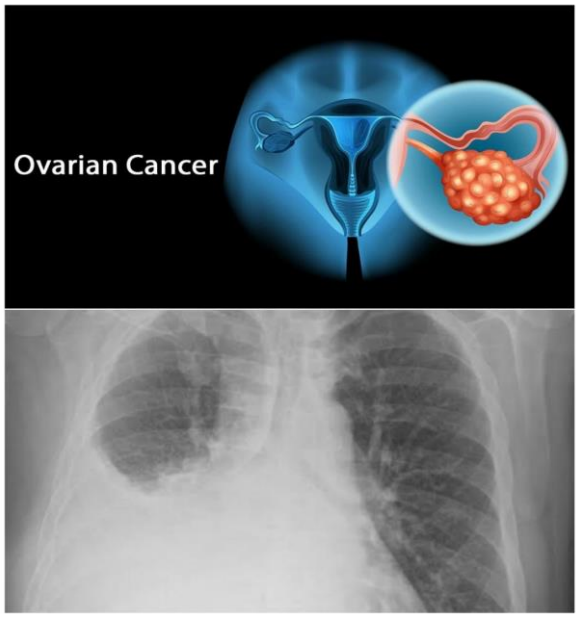

Fig.2: Ovarian & Lungs Cancer.

Marketed Products: Hycamtin (by Novartis) is the main product for topotecan and comes in oral and intravenous formulations 43.
Common side effects of topotecan include 44:

Neutropenia: A decrease in neutrophils, raising the risk of infections;

Thrombocytopenia: A decrease in platelets, which can cause bleeding complications;

Fatigue: Frequently experienced by patients receiving chemotherapy; and

Nausea: A common gastrointestinal side effect.

Podophyllum peltatum, sometimes known as the mayapple, is a plant endemic to North America and the source of podophyllotoxin. The chemical is taken out of the plant 45's rhizomes.

Mechanism of Action: Podophyllotoxin has two main mechanisms to provide its anticancer effects. 46:
It attaches itself to tubulin and stops microtubules from forming, which is necessary for cell division.
By stopping DNA strands from re-ligating after breaking, it inhibits topoisomerase II, an enzyme involved in DNA replication. This results in breakage in DNA strands, which kill cells.

Types of Cancer Treated: Etoposide (Vepesid) and other podophyllotoxin compounds are used to treat 47, 48:

Cancer of the Testicles
Kaposi's Sarcoma
Lung cancer

Products Promoted: Vepesid (Etoposide), the most widely commercialized derivative of podophyllotoxin, comes in oral and intravenous formulations. 49.

Side symptoms: 50 are typical adverse symptoms linked to derivatives of podophyllotoxin.
Frequently occurring adverse effects of chemotherapy include nausea and vomiting.

Bone Marrow Suppression: Increases the risk of infection and bleeding by causing anemia, neutropenia, and thrombocytopenia.

Alopecia: One common side effect of chemotherapy is hair loss.

Artemisinin: Sweet wormwood, or Artemisia annua, is the plant that produces it.

Mechanism of Action: When iron is present, artemisinin produces free radicals that harm cells and trigger apoptosis, especially in cancer cells.
Cancer Types Treated: Leukemia, breast cancer, liver cancer, and colorectal cancer are among the cancer types for which artemisinin is being researched.

Products Sold: Off-label usage of artemisinin-based medicines, such as artemisinin, in the treatment of cancer

has been investigated.
Dizziness, mild gastrointestinal issues, and possible drug interactions are among the side effects 51.

Berberine:

Plant Origin: Berberine comes from the plant Berberis vulgaris, sometimes known as barberry, which has long been used for its therapeutic qualities in many different cultures. Usually, the chemical is extracted from the bark of the root and stem 52.

Mechanism of action: The main way that Berberine prevents cancer is by blocking the Akt/mTOR signalling pathway, which is essential for controlling the development, survival, and metabolism of cancer cells. Berberine can decrease tumor cell proliferation and trigger apoptosis (programmed cell death) by interfering with this mechanism. 53
Ver, may interact with Berberine.

Cancer Types Treated: Berberine has demonstrated promise in the management of a number of cancer types, such as:
Colorectal Cancer
Breast cancer

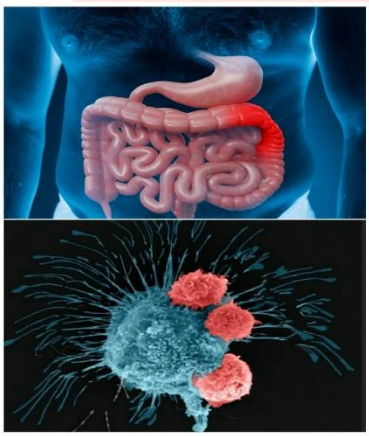

Fig.3: Colorectal & Brest cancer.

Prostate cancer: Preclinical research has shown that it inhibits the growth and spread of cancer cells 54, 55.

Products Promoted:

Berberine is a dietary supplement that is widely accessible and frequently promoted for its many health advantages, including possible effects on cholesterol and blood sugar levels.
Nevertheless, clinical trials are still being conducted to examine its potential as a cancer treatment 56.

Adverse Reactions: The following are typical Berberine side effects: 57

Symptoms of mild gastrointestinal discomfort include cramping and bloating.

Diarrhea: Its effects on gastrointestinal motility may result in diarrhea. Resveratrol: Plant Origin: Vitis vinifera, or grapevine, is the source of resveratrol, especially the skin of grapes. The plant produces this polyphenolic chemical as a defensive mechanism against environmental stressors like UV rays and fungal diseases. 65.

Mechanism of Action: Resveratrol inhibits cancer by activating the SIRT1 gene, which controls multiple processes, including apoptosis, inflammation, and DNA repair. This activation is a possible anticancer agent 66 because it inhibits DNA damage and encourages cancer cells to undergo apoptosis.

Possible Drug Reactions: Berberine may interact with other medications, particularly those that the liver metabolizes.

Origin of Curcumin Plant: The ginger plant Curcuma longa, often known as turmeric, is the source of Curcumin family. The plant's rhizomes contain this active polyphenol component. 58.

Action Mechanism: Curcumin modulates a number of cellular signalling pathways to demonstrate its anticancer effects, including:

NF-kB: A transcription factor implicated in inflammation and the survival of cancer cells is NF-κB.

P53: A tumor suppressor protein that encourages apoptosis and controls the cell cycle.

Apoptosis Cascade: Curcumin causes cancer cells to die by inducing the apoptosis process. In cancer cells, this combination of pathways suppresses cell division and encourages cell death 59, 60.

Types of Cancer Treated: Curcumin has demonstrated promise in the management of a number of malignancies, such as:
Cancer of the colorectal region

Pancreatic cancer

Breast cancer: By influencing inflammation and cell signalling, it is thought to prevent tumor growth and metastasis 61, 62.

Marketed Products: Curcumin C3 Complex, a formulation that is frequently offered as a dietary supplement with anti-inflammatory and antioxidant properties, is the most well-known Curcumin product. 63.

Adverse Reactions: When taken in typical dosages, Curcumin is usually well tolerated; however, excessive dosages might cause:

Gastrointestinal Upset: Including symptoms like diarrhea and bloating. It is crucial to remember that some drugs, particularly those that influence liver enzymes 64, may interact with Curcumin.

Resveratrol:
Plant Origin: Vitis vinifera, or grapevine, is the source of resveratrol, especially the skin of grapes. The plant produces this polyphenolic chemical as a defensive mechanism against environmental stressors like UV rays and fungal diseases. 65.

Mechanism of Action: Resveratrol inhibits cancer by activating the SIRT1 gene, which controls multiple processes, including apoptosis, inflammation, and DNA repair. This activation is a possible anticancer agent 66 because it inhibits DNA damage and encourages cancer cells to undergo apoptosis.
Types of Cancer Treated: Resveratrol has demonstrated promise in the management of a number of malignancies, such as:
Colorectal cancer
Breast Cancer
Research on **prostate cancer** indicates that resveratrol causes cancer cells to undergo apoptosis while also preventing cancer cell growth and metastasis 67, 68.
Blood thinners, resveratrol may

Products Sold: Due to its anti-
aging and antioxidant qualities, resveratrol is frequently s old as a dietary supplement.

Despite ongoing clinical studies, research is currently bei ng done on its potential as a cancer treatment 69.
Adverse Reactions:
Although resveratrol is usually well tolerated, there are 7 0 possible adverse effects:

Interactions with Anticoagulants: When used withake bleeding more likely.
Bloating and diarrhea are examples of

gastrointestinal distress, especially when taken in large quantities.

Cinnamaldehyde:
Plant Origin: The main ingredient is cinnamon aldehyde.
Cinnamon's (*Cinnamomum*) active ingredient species, specifically from Cinnamomum cassia and Cinnamomum verum (*real cinnamon*).
(*Cassia*). It is in charge of the trait.
The fragrance and taste of cinnamon 71.

Mechanism of Action: Cinnamaldehyde works against cancer in a number of ways 72:

Apoptosis Induction: It causes cancer cells to undergo apoptosis, or programmed cell death, by triggering a number of biological processes, including caspases and mitochondrial malfunction.

Cell Cycle Arrest: At the G2/M phase, cinnamon aldehyde causes cell cycle arrest, which stops cells from multiplying.

Anti-inflammatory Effects: It inhibits inflammatory markers that are frequently elevated in the course of cancer, including COX-2, TNF-α, and iL-6.
Angiogenesis Cinnamaldehyde limits tumor growth and metastasis by preventing the development of new blood vessels.

Cinnamaldehyde suppresses angiogenesis, which limits the growth and metastasis of tumors by preventing the development of new blood vessels.

Types of Cancer Treated: Cinnamaldehyde has been investigated for its ability to treat a number of malignancies, including 73:

Lung Cancer: By altering a number of cancer-related pathways, it prevents the growth of lung cancer cells.

Breast Cancer: Research indicates that by triggering apoptosis, cinnamon aldehyde prevents the growth of breast cancer cells.

Colon Cancer: It has been demonstrated that cinnamon aldehyde inhibits tumor growth and causes colon cancer cells to undergo apoptosis.

Fig. 4

Products Sold: Essential oils and extracts based on cinnamon are the main sources of cinnamon aldehyde.

There are now no specific commercial anticancer formulations, and research on its anticancer benefits is still primarily experimental, despite the fact that it is also accessible as a flavouring additive in food goods 74.
Side Effects: When used in food or in little amounts, cinnamon aldehyde is usually safe. Higher dosages, however, could irritate the skin and gastrointestinal tract.

Inflammation, and allergic reactions, particularly for people who are 75 percent sensitive to cinnamon.

Origin of Silibinin Plant: Silybum Marianum, often known as milk thistle, is the source of silibinin. This plant is well-known for

Silbinin is the main active element in silymarin, an active chemical that gives it liver-protective qualities 82.

Mechanism of Action: Silibinin uses a number of ways to stop the growth of cancer cells and trigger apoptosis 83:

Cell Cycle Arrest: It stops the G1 phase of the cell cycle, which stops cancer cells from proliferating.

Induction of Apoptosis: It encourages cancer cells to undergo programmed cell death.

Modulation of Signaling Pathways: Silibinin controls NF-κB and p53, two pathways essential for cell survival and death. These routes
play important roles in the survival, metastasis, and proliferation of cancer cells.
] Types of Cancer Treated: Silibinin has demonstrated promise in the management of: Liver cancer
Prostate cancer

Fig. 5:

Silbinin has been shown in studies to prevent tumor growth and spread in breast and prostate malignancies, with a particular emphasis on liver cancer, where it is currently the subject of active research 84.
Products Sold: Silibinin is sold under the brand name Legal on, a silymarin extract intended to treat liver conditions, mainly to shield the liver from toxins and help in the regeneration of the liver. Research on its potential for treating cancer is still ongoing 85.
The most frequent **side effect** of silibinin is minor stomach discomfort, which is often easily tolerated. Additional adverse consequences include uncommon, but at greater dosages, may cause nausea or diarrhea 86.

Shikimic Acid:
Plant Origin:
Shikimic acid is a naturally occurring organic acid that is mostly present in plants such as Pinus species (pine) and Illicium verum (star anise).
Ginkgo biloba, and needles. In plants, it is essential for the production of aromatic chemicals 149.

Mechanism of Action: Shikimic acid has anticancer effects via a number of mechanisms, including:

Shikimic Inhibition of Cancer Cell Proliferation: By disrupting the control of the cell cycle and triggering apoptosis, acid prevents the proliferation of cancer cells. It suppresses the expression of molecules involved in cell division 150, including cyclin-dependent kinases.

Activation of Apoptotic Pathways: Shikimic acid activates caspases and causes mitochondrial dysfunction to trigger apoptosis in various cancer cell lines. This process is mediated by the down regulation of Bcl-2 proteins and the up regulation of pro-apoptotic factors 152.

Inhibition of Angiogenesis: Shikimic acid inhibits angiogenesis by down regulating important molecules such as VEGF (vascular endothelial growth factor), which inhibits the formation of new blood vessels required for tumor growth 151.

Antioxidant Properties: Shikimic acid is an antioxidant that lowers oxidative stress and scavenges free radicals, both of which are important in the onset and spread of cancer 153.

Cancer Types Treated: The potential of Shikimic acid in treating a number of cancer types has been studied.

Breast Cancer: Research indicates that Shikimic acid suppresses the growth and migration of breast cancer cells by controlling important signaling pathways like PI3K/Akt and MAPK. 154**.**

Lung Cancer: By controlling cell cycle checkpoints and apoptotic processes, Shikimic acid has been demonstrated to prevent lung cancer cell proliferation and invasion. 155.

Colorectal Cancer: Shikimic acid suppresses angiogenesis and activates apoptotic pathways to prevent colorectal cancer cells from growing and spreading. 156**.**

Shikimic acid was one of the products listed:

Shikimic acid is most frequently found in nutritional supplements and herbal formulations, particularly as an ingredient in

Verum Illicium (star anise). Additionally, it is utilized in the manufacturing of oseltamivir (Tamiflu), an antiviral medication for influenza that is made from plant source 157.

Side Effects: While Shikimic acid is generally well tolerated, excessive use may result in mild gastrointestinal issues like nausea.

Vomiting or diarrhea.

Gastrointestinal Disturbances: Overdosing might cause discomfort including bloating, gas, or abdominal pain 158.

Aloe Vera Extract:

Plant Origin: Aloe barbadensis, a succulent plant that is frequently utilized in

Traditional medicine for its ability to heal, especially for digestive and skin conditions. Aloin, emodin, and polysaccharides are among the bioactive substances contained in the plant that have been shown to have anticancer effects 97.

Mechanism of Action: Aloe vera extracts, particularly those containing emodin and aloin, exhibit anticancer properties by means of the

The mechanisms listed below**.**

Apoptosis Induction: Compounds in aloe vera cause cancer cells to undergo apoptosis, or programmed cell death.

Inhibition of Angiogenesis: The substances prevent the growth of new blood vessels, which is necessary for tumors to spread**.**

Aloe vera chemicals inhibit cell proliferation, which stops cancer cells from proliferating quickly (98).

Cancer forms Treated: Research has examined the anticancer properties of aloe vera extract in relation to a number of cancer forms, including

Colorectal Cancer: Compounds in aloe vera prevent colorectal cancer cells from growing.

Skin Cancer: Because aloe vera may control **cell** division and death, it is especially useful in the treatment of skin cancer.

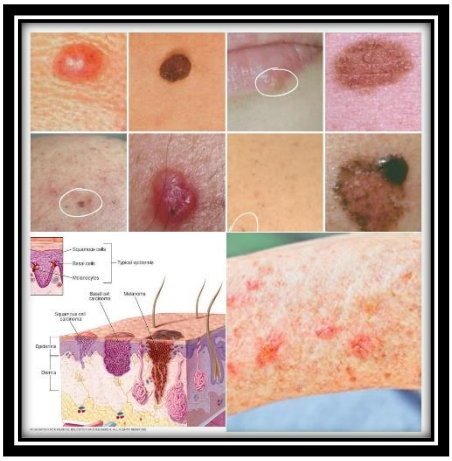

Fig. 6

Lung Cancer: Cell death and growth suppression are two of aloe vera's actions on lung cancer cells 99.

Products Sold: Aloe vera is frequently sold as an oral supplement for digestive problems and as a topical remedy for skin disorders.

The possibility of some of these products in cancer treatment is being studied. Aloe vera-based products come in a variety of forms, including drinks, gels, and creams.

Side Effects: Although aloe vera is usually safe, it might have minor adverse effects, especially if administered topically or consumed in excessive amounts**.**

Gastrointestinal Problems: When taking aloe vera, some people may get nausea, diarrhea, or cramping in their abdomen.

Skin Irritation: In sensitive people, topical treatment may result in allergic responses or skin irritation 101.

Sr no.	Drug name / Plant Origin	IMAGE

Plant Origin of Saponins: Saponins are a broad class of substances present in a variety of plants, including Quillaja sayonara (soapbark tree) with ginseng. These substances are utilized in numerous traditional remedies and are well-known for their foamy qualities. Their possible therapeutic benefits are being investigated, especially in the treatment of cancer 102.

Multiple mechanisms underlie saponins'

Anticancer activity:

Immune modulation: Saponins boost the immune system's capacity to combat cancer cells by inducing immune responses**;**

Inhibition of cell proliferation: they stop cancer cells from proliferating unchecked**;**

And induction of apoptosis: they encourage programmed cell death in cancer cells 103.

Cancer Types Treated: Saponins have shown potential in the treatment of several cancers, **including: Breast Cancer:** Saponins inhibit the growth of breast cancer cells and reduce **metastasis. Lung Cancer:** Studies show that Saponins suppress lung cancer cell growth. **Liver Cancer:** Saponins also inhibit the growth of liver cancer cells and promote their apoptosis 104

CONCLUSION: Anticancer medications derived from plants
have demonstrated a great deal of potential in preclinical and medical environments. The evolution and
The use of these medications has transformed cancer therapy, with numerous options already accessible on
the market as well as other others that are planned. Their modes of operation, such as the suppression of the growth of cancer cells, induction of

Apoptosis and immune response regulation, making them useful supplements to traditional treatments. But there are still difficulties, such as improved bioavailability, decreased toxicity, and conquering resistance to drugs.
As studies go on, plant-based medications could play a a growingly significant part in the management of Different types of cancer, enhancing and even increasing the efficiency of conventional agents used in chemotherapy.

1 Vincristine
(Catharanthus roseus)
(Periwinkle)

2 Vinblastine
(*Catharanthus roseus)*
(Periwinkle)

3 Taxotere
(Taxus baccata)

4 Resvitralol
(Vitis vinifera)

5 Cinnamon
(Cinnamomum verum)

6 Aloe Vera
(Aloe barbadensis miller)

7 Shikimic acid
(Illicium verum)

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