**ANDROGRAPHOLIDE AND ITS ANALOGUES IN LUNG CANCER**

# **M. Alagusundaram1, Mishra Namrata \*1, Bhattacharya Vijeta1, Venketeshwarlu Goli 2 G. Sai Sri Harsha3**

Assistant professor school of Pharmacy, ITM University Gwalior, Madhya Pradesh

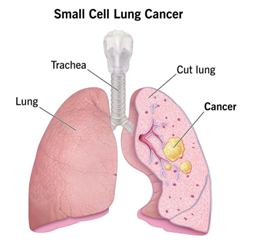
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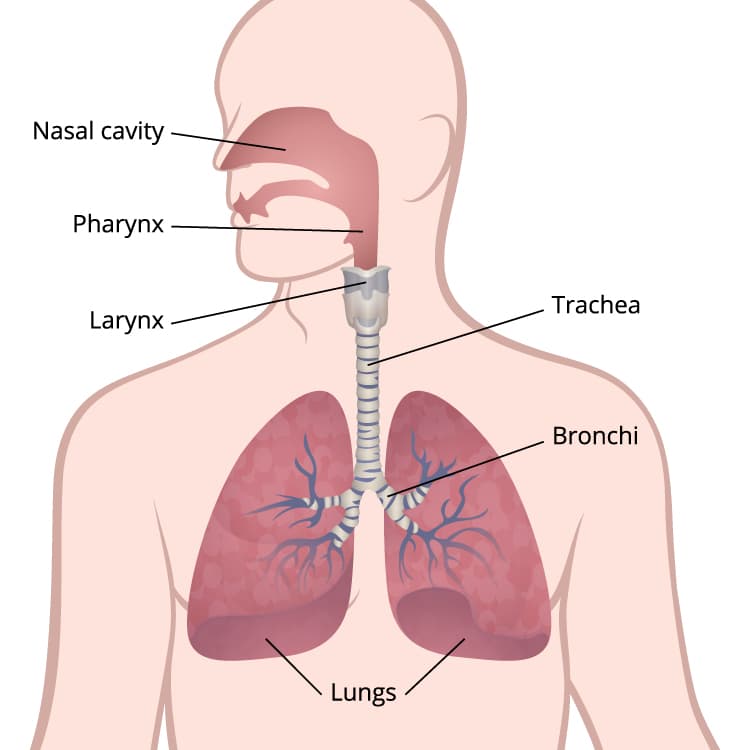
**Introduction**

A lung tumor be located one category of tumor that grows in the lungs. You can exhale in oxygen and exhale out carbon dioxide cheers towards the binary elastic body part, your lungs, which are situated in your upper body. Lung cancer is the primary cause of cancer-related expiries globally. Even persons who have not once smoked can advance lung cancer, but smokers are more at risk than nonsmokers. Your casual of emergent lung cancer is unfair by how several cigarettes you've smoked and how frequently. Resigning burning can knowingly lessen your jeopardy of developing lung cancer, even after years of smoking. A disorder known as cancer occurs when the figure's cells flourish unrestricted. Lung cancer is another name for the condition when it first manifests. In addition to lymph nodes and other body organs including the brain, lung cancer can also start in the lungs. Figures 1 and 2 illustrate how lung cancer can spread from different organs. When cancer cells spread from one organ to another, they are referred to as metastases.

Glandular cancer and squamous lockup carcinoma are two specimens of small and non-small lockup lung tumours that fall into these two main types. These frequent categories of lung tumours have distinctive patterns of development and satisfying responses. Non-small-cell lung cancer is more mutual than small-cell lung cancer. The foremost process of stoppage is to dodge risk factors plus soldering and air litter. Behaviours and long-standing products are influenced by the category of cancer, the stage (amount of banquet), and the patient's general condition. Record illnesses cannot be cured. Radiotherapy, chemotherapy, and surgery are often used treatments. Surgery is occasionally used to treat NSCLC, although chemotherapy and radiotherapy are typically more effective for treating SCLC.

Lung cancer will have killed 1.8 million people and impacted 2.2 million people globally in 2020. Designed for both men and women, it is the principal foundation of cancer-related passing. The average diagnosis age is 70. The five-year subsistence proportion is typically between 10 and 20%, however, it reaches 33% in Japan, 27% in Zion, and 25% in the Nation of Korea. Conclusions are normally of inferior quality in undersized nations.





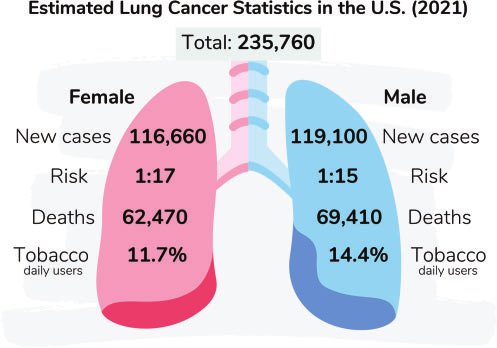
**Lung’s cancer**

**Prevalence and Death Rates highlight the severity of the diseases**

Number of Malignance Demises Anticipated In the United States, cancer-related fatalities are predicted to total 609,360 in 2022, or over 1700 each day. Male lung, prostate, and colorectal malignancies reason the most fatalities, while female lung, breast, and colorectal cancers cause the most fatalities (Fig. 1). The anticipated mortality toll from these and other prevalent cancers is broken out by the state in Table 4. Lung melanoma will privilege the breaths of more than 350 people each day, which is 2.5 times more than CRC, the other biggest source of tumor death, and more than the chest, prostate, and pancreatic growths overall. In 2022, the smoking-related death toll will account for about 105,840 of the 130,180 lung cancer deaths (81%), and another 3650 deaths resolve outcome of another needle smoke. 26 The other 20,700 non-smoking-related lung malignancy expiries would be the ninth most common cancer death caused for both sexes if they were counted individually.

To benefit from improvements in statistical modellings and increased cancer registration coverage, the procedure intended for determining current malignance belongings and diseases stayed modified in 2021 and is discussed in detail elsewhere. Invasive cancer incidence data from 50 states and the Quarter of Columbia were used to guess complete counts for each state from 2004 to 2018 using delay-adjusted, high-quality rate data (98% population coverage; data were unattainable for a few sporadic years for a small number of states). To account for state-level changes in sociodemographic and means characteristics, clinical sceneries, and growth-showing customs, a generalized linear mixed model was utilized. Then, a novel, data-driven join point technique was used to extrapolate modeled state and national counts to 2022.

Using data from 49 states with high-quality data available for all 10 years and age-specific NAACCR incidence rates, as well as US Census Bureau population estimates provided through SEER\*State, the estimated number of new suitcases of lung cancer or passing cases, original bags of ductal carcinoma in situ of the female front, and new cases of situ growth of the skin spotted in 2022 was first estimated. The counts were then projected to 2022 based on the Employing SEER 21 delay factors for invasive disease (delay factors are not available for in situ cases), the joining point regression model's average APC was created and adjusted for reporting delays. Using the prior data-driven join point technique described for the case projection to report cancer fatalities from 2005 through 2019 at the state and national levels as reported to the NCHS allowed for the prediction of the anticipated number of cancer deaths in 2022.



Ten Most Common Cancer Types by Assessed New-fangled Suitcases and Deaths from Cancer thru Sex in the United States in 2022 Except for bladder cancer, guesses are curved to the closest 10 and do not include basal cell, squamous cell, or in situ carcinomas. The ranking may not match the most current observed data because it is based on predicted projections.**.**

**Current treatment of lung cancer and their limits**

Depending on the type of cancer and the extent of its spread, there are many treatments for lung cancer. Patients with non-small-cell lung cancer may be given surgery, chemotherapy, radiation therapy, targeted therapy, or a combination of these therapies. Small-cell lung cancer is often treated with chemotherapy and radiation therapy.

**Surgery.** is a process in which medical professionals remove malignant tissue.

**Chemotherapy**. utilizes novel drugs to eradicate or decrease cancer The medications can occasionally be given intravenously and orally. therapy with radiation. employing high-energy beams that resemble X-rays to destroy cancer

**Targeted treatment**. blocking the growth and spread of cancer cells using medication Drugs might be administered intravenously or as pills that you ingest. You will undergo tests to see whether targeted therapy is appropriate for your particular cancer type before starting this treatment.

To treat lung cancer, many medical specialties typically work together. Medical doctors who specialize in lung conditions are referred to as pulmonologists. Surgeons are medical professionals who carry out operations. Thoracic surgeons specialize in surgeries of the chest, heart, and lungs. Medical doctors called oncologists utilize medication to treat cancer. Medical experts known as radiation oncologists utilize radiation to treat cancer..

## **Diagnosis**



**Testing healthy people for lung tumor**

People who are at a greater risk for lung cancer may want to think about getting yearly low-dose CT scans to check for the disease. In the aforementioned Figure 4, the bronchoscopy pop-up dialog box is used to diagnose malignancy. Older persons who have smoked heavily for many years or who have quit within the last 15 years typically receive lung cancer screening.

Talk to your doctor about your risk of lung cancer. You and your partner can determine if lung cancer screening is a good idea for you.

Lung cancer diagnostic procedures Your doctor may run a number of tests to look for malignant cells and rule out other disorders if there is cause to believe that you may have lung cancer.

Testing might involve:

1. **Exams using images**. An atypical lung tumor or nodule may be visible on an X-ray. A CT scan can reveal small lung lesions that may not be visible on an X-ray.
2. **Cytology in pneumonia**. Lung cancer cells can occasionally be observed when sputum is coughed up and studied under a microscope. This is particularly true if you are coughing up sputum.
3. **A tissue biopsy sample**. A biopsy procedure enables the removal of a sample of abnormal cells. Your doctor may perform a biopsy using a variety of techniques, such as bronchoscopy, which entails inserting a lighted tube down your throat and into your lungs to look for abnormal lung tissue.
4. Another choice is mediastinoscopy, which involves making a small incision at the base of your neck and having surgical instruments inserted behind your breastbone to collect tissue samples from lymph nodes.
5. Needling biopsy is yet another choice, in which your doctor guides a needle through your chest wall and into the lung tissue to collect suspect cells using X-ray or CT pictures.
6. Lymph nodes and other locations where cancer has progressed, such as your liver, may also be the subject of a biopsy.
7. The sort of lung cancer you have will be determined by a careful examination of your cancer cells in a lab. the exact traits of your cells that can help your doctor determine your prognosis and direct your treatment can be revealed by the results of sophisticated testing.

**Tests to regulate the level of the tumor**

The extent (stage) of your cancer will be determined by your doctor when lung cancer has been detected. The stage of your cancer aids you and your doctor in selecting the best course of action. Imaging techniques may be used as part of staging testing so that your doctor may check for signs that cancer has moved outside of your lungs. These examinations consist of bone scans, positron emission tomography (PET), CT, and MRI. Discuss whether tests are acceptable for you with your doctor because not everyone needs them. The stages of lung cancer are denoted by Roman numerals ranging from 0 to IV, with the lowest stages signifying lung-specific malignancy. Stage IV signifies the cancer's advanced stage and the extent to which it has spread throughout the body. Your overall health, the type, and stage of your illness, as well as your preferences, all play a role in the cancer treatment plan that you and your doctor decide on. You might decide in some circumstances not to receive therapy. For instance, you might believe that the risks of the medication outweigh any potential advantages. If that is the case, your doctor might advise comfort care, which merely addresses cancer's associated symptoms like pain or shortness of breath.

**Lung cancer surgery Open pop-up dialog box**

Your surgeon works to remove the lung cancer along with a margin of healthy tissue during surgery. Lung cancer removal techniques include:

Using a wedge resection, the tumor-containing lung tissue and a portion of surrounding healthy tissue are removed.

Using a segmented resection, more of the lung can be removed without removing a full lobe.

To remove one lung's whole lobe, do a lobectomy.

A complete lung is removed during a pneumonectomy.

If you have surgery, your surgeon might also remove some of your chest lymph nodes to look for any indications of malignancy. If your cancer is limited to your lungs, surgery can be a possibility. To decrease a larger lung cancer before surgery, your doctor may advise chemotherapy or radiation treatment. Your doctor may advise chemotherapy or radiation therapy following surgery if there's a chance that cancer cells were left behind or if your cancer might relapse

**Radiation therapy**

In radiation therapy, powerful energy beams from sources like protons and X-rays are utilized to destroy cancer cells. During radiation therapy, a machine revolves around you as you lay on a table, distributing radiation to particular parts of your body. Patients with locally advanced lung cancer may get radiation therapy either before or after surgery. It typically occurs together with chemotherapeutic procedures. If surgery is not a possibility, your main course of treatment can be a combination of chemotherapy and radiation therapy. Advanced lung cancers and those that have spread to other parts of the body may benefit from radiation therapy to help relieve symptoms including discomfort.

**Chemotherapy**

Chemotherapy employs drugs to eradicate cancer cells. One or more chemotherapy drugs may be administered intravenously or orally. Over the course of a few weeks or months, a number of treatments using a combination of medications are frequently given, with breaks in between to allow for recuperation. Chemotherapy is routinely used following surgery to eliminate any cancer cells that could have survived. It can be used with radiation therapy or used on its own. Chemotherapy is sometimes used to shrink malignancies before surgery so they are easier to remove. Patients with advanced lung cancer can use chemotherapy to address their symptoms, including discomfort..

**Stereotactic body radiotherapy**

Stereotactic body radiotherapy, sometimes referred to as radiosurgery, is a strenuous radiation therapy that directs several radiation beams toward cancer from various angles. Usually, stereotactic body radiation is finished in one or rare assemblies. For those with tiny lung malignancies who cannot have surgery, stereotactic body radioactivity may be an substitute. It can also be cast-off to treat lung malignance that has developed to the brain and other tissues.

**Targeted drug therapy**

Targeted drug therapies focus on certain flaws that are common in cancer cells. By halting these abnormalities, targeted pharmaceutical therapy can kill cancer cells. Despite the fact that there are several drugs for targeted therapy on the market, the majority are only given to patients with advanced or recurrent cancer. Patients who can benefit from targeted therapy are the only ones who have specific genetic changes in cancer cells. Your cancer cells may be studied in a lab to determine whether these treatments would be helpful..

**Immunotherapy**

In order to fight cancer, immunotherapy makes use of your immune system. Your body's disease-fighting immune system might not attack your cancer because cancer cells might produce proteins that help them hide from immune system cells. Immunotherapy alters how well that process operates. Only immunotherapy is normally used to treat patients with locally advanced lung cancer and tumors that have spread to other parts of the body.

**Palliative medicine**

The adverse effects of treatment as well as disease symptoms are frequently experienced by people with lung cancer. Salaried with a registrar to lessen your signs and indications is a key section of loyal care, occasionally referred to as palliative care. To make sure you're comfortable throughout and after your cancer treatment, your doctor might advise that you meet with a palliative care team immediately after your diagnosis.

According to a study, persons with advanced non-small cell lung cancer who started receiving supportive care as soon as they received their diagnosis lived longer than those who continued receiving treatments including chemotherapy and radiation. People who received supportive care said their moods and quality of life had improved. They lived nearly three months longer than those who received routine care on average

**Importance of natural products and highlight the importance of medicinal plants in lung cancer**

Natural goods are priceless presents from nature to humans. They comprise a variety of chemical substances that are produced naturally in humans and animals, as well as extracts from plants and animals, metabolites from insects, marine life, and microorganisms. Additionally, natural ingredients combined with TCM theory form the foundation of traditional Chinese medicine (TCM). Drug discovery has traditionally benefited from the use of natural products. Numerous prescription medications used for treatment are made from natural sources, according to the most recent information on medications approved by the Food and Drug Administration (FDA) in the United States. Over 50% of newly approved medications between 1946 and 2019 were natural small compounds. Chinese medicines and plant-based remedies are examples of multi-component, multi-channel, and multi-targeted products. Natural products continue to catch the attention of researchers due to their variety of structures and functions. The natural compounds that target and control the TME of lung cancer have not been systematically compiled, even though TME has been the subject of many studies. The anticancer effect of natural products on TME in lung cancer is discussed in this review. We list pertinent natural products together with explanations of how they modulate the TME in lung cancer when taken alone (Table 1), in combination with anticancer medications (Table 2), and combination with substances like nanomaterials (Table 3).

Table 1

The effects of natural products on modulation of the TME.

| **No.** | **Natural Products** | **Common Source** | **Cell Lines or Animal Models or Patients** | **Function or Molecular Mechanism** | **Ref.** |
| --- | --- | --- | --- | --- | --- |
| *Targeting angiogenesis* | | | | | |
| 1 | Jolkinolide A (**1**) | *Euphorbia* *fischeriana* | A549, HUVEC; A549 cell xenograft mice | VEGF protein expression is decreased and the Akt-STAT3-mTOR signaling pathway is blocked, which also prevents HUVEC motility. |  |
| 2 | Jolkinolide B (**2**) |
| 3 | Parthenolide (**3**) | *Tanacetum* *parthenium* | A549, H526 | Induction of apoptosis, suppression of angiogenesis, and inhibition of A549 and H526 cell growth in the presence and absence of nicotine. Bcl-2 expression is downregulated, while E2F1, p53, GADD45, Bax, Bim, and caspase 3, 7, 8, and 9 expressions are upregulated. |  |

**Bronchoscopy Open pop-up dialog box**

**Exploratory strong entities for lung malignancy**

People who are more likely to develop lung cancer may consider receiving yearly low-dose CT scans to screen for the condition. Lung cancer screening is often given to older people who have smoked heavily for a long time or recently quit smoking. Discuss your risk of lung cancer with your doctor. You can decide whether or not you should get screened for lung cancer with your partner.

**Tests to establish cancer's severity**

The amount (stage) of your growth will be strong-minded by your registrar when lung cancer has been detected. The stage of your cancer aids you and your doctor in selecting the best course of action. Imaging techniques may be used as part of staging testing so that your doctor may check for signs that cancer has moved outside of your lungs. These examinations consist of bone scans, positron emission tomography (PET), CT, and MRI. The stages of cancer are shown in Figure 5. Discuss whether tests are acceptable for you with your doctor because not everyone needs them.

The stages of lung cancer are denoted by Roman numerals ranging from 0 to IV, with the lowest stages signifying lung-specific malignancy. Stage IV signifies the cancer's advanced stage and the extent to which it has spread throughout the body.

**Risk factors of colon cancer**

As you age, your risk of developing colorectal cancer rises. Other danger considerations include:

* Crohn's disease and ulcerative colitis are examples of inflammatory bowel conditions
* A history of colorectal cancer or polyps in the family or personally.
* A genetic syndrome like Lynch syndrome or familial adenomatous polyposis (FAP), which are hereditary non-polyposis colorectal cancers.

These are a few instances of lifestyle factors that may increase the risk of colorectal cancer.

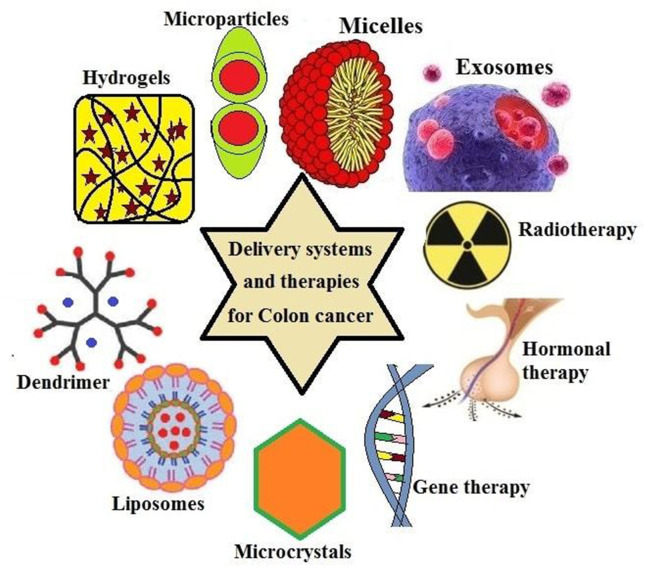
• A diet lacking in fruits and vegetables.

• A lack of regular exercise.

• A diet that consumes a lot of processed meats or is heavy in fat and low in fiber.

• Overweight and obesity.

• Alcohol use.



**Drug targets in colon cancer**

Researchers have created new kinds of medications that directly target the cell changes that lead to colon or rectal cancer as they learn more about these changes. Chemotherapy treatments function differently from targeted medications. They frequently have different adverse effects and occasionally are more effective than chemo medicines. If chemo is not an option, it can be used either alone or in conjunction with chemo. These drugs work against cancers that have spread to remote areas of the body because, like chemotherapy, they are taken into the bloodstream and reach almost every part of the body.

**Current treatment strategies and side effects**

Use a scope to do a colonoscopy to look into your colon. During a colonoscopy, your whole colon and rectum are seen thanks to a long, flexible, and thin tube that is connected to a video camera and monitor. If any suspicious areas are found, your doctor may introduce surgical instruments through the tube to take tissue samples (biopsies) for analysis and remove polyps.

blood testing. There is no blood test to detect colon cancer.. However, your doctor may perform blood tests to look for indicators of your general health, such as outdated kidney and liver function tests.

Your doctor may perform a blood test to check for a substance called a carcinoembryonic antigen, or CEA, which colon tumors occasionally generate. Your doctor may be able to determine your prognosis and whether your cancer is responding to therapy by monitoring the level of CEA in your blood over time.

Skin issues including an acne-like rash on the face and chest during therapy, which can occasionally result in infections, are the most frequent side effects of these medications. It might be necessary to use an antibiotic cream or ointment to help prevent the rash and associated illnesses. When this rash appears, the malignancy is frequently responding to therapy. The majority of those who have this rash live longer, and those who experience more severe rashes also appear to recover faster than those who get milder rashes. Other negative effects include: fatigue, fever, and Diarrhea, among other symptoms

An allergic reaction that occurs during the infusion of these medications is an uncommon but dangerous adverse effect that may result in breathing difficulties and low blood pressure. Before receiving therapy, you might receive medication to help avoid this. Importance of medicinal plants and phytocompounds in colon cancer

To improve a thorough examination, a methodical search approach was created. phrases like "The Mesh terms "anti-tumor," "anti-cancer," "bioactivity," "biological activity," "phytochemicals," and "pharmacological activities" were combined with one or more of the terms "colorectal cancer," "colon cancer," "adenomatous polyps," "colorectal tumor," and "colon tumor." These terms must be used in conjunction with the following plant or fungal terms: "banana," "pomegranate," "leguminous plant," "legumes," "hibiscus," "hibiscus sabdariffa," "cruciferous vegetables," or "cruciferous plants"."

The physiological effects of nutritional support treatments, such as different herbal, mineral, and vitamin supplements, are now better understood as a result of extensive research. Additionally, it is thought that a deeper comprehension of the biological makeup of cancer cells would help certain complementary treatments and cancer-fighting medications work more effectively over time. Yeşilada claims that 5-fluorouracil (5-FU), a chemotherapy drug used to treat colon cancer, has significant side effects that patients must tolerate in real-world situations. In a related study on the topic, the blood values of the experimental animals also significantly increased (red cell, neutrophil, and monocyte counts increased by 1,2 fold, 9 fold, and 6 fold, respectively). He mentioned that blueberries are useful in the treatment of colon cancer. The literature research has demonstrated the therapeutic and preventive effects of Rheum ribs, Nigella sativa, Echinacea purpurea, Lignum usitatissimum, Punica granatum, Cronus mas, and Vaccinium myrtillus on colon cancer.

**Cancer and** **Rheum Ribes**: It promotes the treatment of cancer kinds like stomach, intestinal, lung, brain, and lymphocyte lymphoma in Figure 6, in addition to its many other advantages. Many distinct recipes call for raw Rheum ribs along with olive oil, egg, ginger, and Rheum



**Rheum ribes**

Drugs for rheumatoid arthritis directly affect malignant cells and cause them to shrink; even after just two days, 50% of them are gone. Rheumatoid ribs are therefore often utilized in the pharmaceutical business.

**The active component of Nigella sativa** (black seed), Timokinone, is utilized as an antioxidant, anti-inflammatory, and antineoplastic (anti-tumor cells inhibit development) medicine. Nigella sativa and cancer. Figure 7 shows how to diagnose lung cancer with nigella sativa. Timokinone is used as a starting ingredient in medications for adenocarcinomas of the chest, colorectal, colon, pancreatic, uterine, neoplastic keratinocytes, human osteosarcoma, fibrosarcoma, and lung. Additionally, the androgen hormone receptor (non-responsive) timocino prevents prostate cancer by concentrating on the E2F-1 transcription factor and receptor.



**Nigella sativa**

Laboratory tests have demonstrated that the black seeds of Nigella sp. boost the immune system, increasing resistance to cancer as well as the body's ability to fight off viruses and other harmful bacteria.

**Echinacea purpurea (L.) and cancer Moench**: E. purpura is effective against pancreatic and colon cancer in Figure 8. E. purpura is taken in large quantities as an anti-aging agent in several countries due to its potent antioxidant capabilities.



**Echinacea purpurea**

E. purpurea is used to complement chemotherapy in many cancer therapies, particularly those for blood cancers because it lowers free radicals. Tea in particular helps to boost immunity and stave against other diseases by preventing immunological deficiencies brought on by chemotherapy.

**Linum usitatissimum** (L.) and cancer Figure 9 is utilized to treat lung cancer in the example below. Breast, colon, and pancreatic cancer are all prevented by consuming flax seeds. Omega 3 fatty acids alpha-linolenic acid (ALA), Omega 6 fatty acids linoleic acid (LA), Omega 9 fatty acids oleic acid (OA), lignans (SDG), mucilage, and vitamin A (beta-carotene) are all found in flax seed.



**Linum usitatissimum**

Usitatissimum has a high percentage of modest amounts of potassium, magnesium, iron, copper, zinc, and different vitamins, as well as a lot of fiber and highly polyunsaturated fatty acids.

**Punica granatum (L.)** and cancer: Punica granatum L. is useful in the treatment of prostate, breast, and colon cancer. Alkaloids with the names starch, manner, resin, triterpene acids, tannins, pellets, Impellitteri, and methylpelletieri can be found in the root and trunk shells. Figure 10 shows that the fruit peel and flowers—again, as previously mentioned—contain alkaloids and tannins. Pomegranate, Iron, potassium, calcium, phosphorus, and vitamins B1, B2, and C are also included (Ayaz and Alpsoy, 2007). High quantities of antioxidant tannin and flavonoid compounds are present in pomegranate juice. Pomegranate juice has potent anti-tumor properties that induce apoptosis, alter the cell cycle, and suppress androgen receptor expression.



High quantities of iron and vitamin C block the impacts that could result from boosting people's immune systems (Başgöl, 2007). As a result, frequent pomegranate juice consumption has been shown to have positive effects on avoiding prostate cancer and slowing the spread of the disease.

**Cornu’s mas (L.) and cancer Lung,** head and neck, colon, liver, breast, prostate, oesophageal, and soft tissue malignancies can all be successfully treated with C. mass. The hormone melatonin is secreted in the brain.

It is present in cranberry fruit, which improves our quality of life. Utilized in Figure 11. Due to this, it is also utilized to stop side effects including depression and sleep issues that patients may suffer while undergoing treatment. Because it is a potent diuretic, it also functions as an antioxidant. It effectively gets rid of toxic substances that have built up in the body. Additionally, C. mas contains a variety of organic plant compounds, vitamin K, manganese, and phytonutrients.



They defend the body from damaging free radicals, as evidenced by their anti-inflammatory and anti-cancer capabilities. Due to the vitamin C it contains, it is a potent natural antioxidant. It can decrease the body's susceptibility to pathogenic pathogens and reduce some damage caused by free radicals (Topuz, 2012). One prominent cause of urinary tract infections is urinary tract infections (UTIs). Cranberries should be consumed, especially by people who frequently get sick or who are in danger of getting sick. By preventing Helicobacter pylori bacteria from adhering to the lining of the stomach wall, cranberry juice also guards against stomach ulcers and stomach cancer (Topuz, 2012). The plant of C. mas can be used to make water, sherbet when boiled, or fruits. However, if sugar is added to the syrup, it loses its ability to prevent cancer and starts to cause it. Because of this, just like with any plant, how the cranberry plant is ingested is crucial.

**Vaccinium myrtillus (L.) with cancer**: Pterostilbene, ellagic acid, and vitamin C are all present in blueberries, which are also high in several cancers, particularly colon, uterine, and liver cancers. Cancer is being treated in Figure 12. A daily serving of fresh or dried blueberries greatly lowers the chance of developing cancer in people (HTML Access Date: May 1, 2013). Some proanthocyanidins, a type of dye called V. myrtillus, vitamins A and C, beneficial sugars, organic acids, tannins, pectin, and merlin give the fruit its color. V. myrtillus fruit can be eaten fresh, dried, or made into tea.



**Andrographolide and its analogy role in colon cancer**

Additionally, andrographolide has been demonstrated to inhibit colon cancer by way of the apoptotic route. Human HT-29 colon cancer cells experienced apoptosis as a result of it, which appears to be related to increased intracellular ROS levels and disturbance of the mitochondrial membrane potential via the regulation of caspase-3 activity.

* Analogy and andrographolide have traditionally been used to treat disorders like allergic responses, hemorrhagic lesions, and central nervous system malfunction. According to reports, andrographolide, and its derivatives have a strong therapeutic potential for treating human cancer, inflammation, common colds and coughs, and liver diseases. As antipyretic, anti-inflammatory, hepatoprotective, immunostimulant, and anti-neoplasm medicines, these metabolites have also been employed. Andrographolide has poor bioavailability due to its low aqueous solubility, which is then employed for oral administration in adequate tissue localization and for subpar therapeutic objectives. Because of their short half-lives and ease of excretion through the gastrointestinal system and urine, andrographolide and its derivatives have great qualities in that they do not stay in the body for a very long time.
* Hepatoprotection
* anti-aggregation of platelets
* Anti-inflammation Anticancer
* Cytotoxicity
* Induction of apoptosis
* Antitumor

**CONCLUSION**

Anticancer treatments have benefited significantly from the use of natural ingredients. All of the potent and effective anticancer medications including aspirin, vincristine, vinblastine, and paclitaxel are derived from bioactive compounds found in plants. In numerous nations, including India, Andrographis paniculate has been used medicinally in traditional medicine. In addition to having immunosuppressive, antipyretic, analgesic, hepatoprotective, antiviral, and anti-inflammatory effects, andrographolide is one of the key bioactive compounds. Figure 2 illustrates the cumulative effects and mechanism of action of andrographolide. Andrographolide and analog triggered cell cycle arrest, promoted apoptosis in a variety of cancer cells, and showed anticancer effects. In both animal and human cancer cells, andrographolide and analogs produced cell cycle arrest, apoptosis, and reduced metastasis and anti-angiogenesis. Because andrographolide can suppress the activity of v-Src, NF-B, STAT3, and PI3K/AKT as well as impede the advancement of the cell cycle, inflammation, metastasis, and the formation of new blood vessels, these effects are the outcome of the compound. For the development of anticancer drugs, substantial chemical-biological research has been conducted on analogy and andrographolide. In equally in vitro and in vivo representations, several andrographolide analogs consume demonstrated superior anticancer activity. To confirm the pharmacological, pharmaceutical, and toxicological effects of andrographolide, additional clinical and biological investigations are needed.