

**HERBAL DRUGS USED IN CANCER**

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Article Received on 24/01/2017

Article Revised on 14/02/2017

Article Accepted on 06/03/2017

**ABSTRACT**

Cancer is uncontrolled growth of abnormal cells in the body. Nowadays, cancer is considered as a human tragedy and one of the most prevalent diseases in the wide, and its mortality resulting from cancer is being increased. It seems necessary to identify new strategies to prevent and treat such a deadly disease. Control survival and death of cancerous cell are important strategies in the management and therapy of cancer. Anticancer agents should kill the cancerous cell with the minimal side effect on normal cells that is possible through the induction of apoptosis. Apoptosis is known as programmed cell death in both normal and damaged tissues. This process includes some morphologically changes in cells such as rapid condensation and budding of the cell, formation of membrane-enclosed apoptotic bodies with well-preserved organelles. Induction of apoptosis is one of the most important markers of cytotoxic antitumor agents. Some natural compounds including plants induce apoptotic pathways that are blocked in cancer cells through various mechanisms in cancer cells. Multiple surveys reported that people with cancer commonly use herbs or herbal products. Vinca Alkaloids, Taxans, podo phyllotoxin, Camptothecins have been clinically used as Plant derived anticancer agents. The present review summarizes the literature published so far regarding herbal medicine used as inducers of apoptosis in cancer.

**KEYWORDS:** □ Cancer, Apoptosis, Herbal medicine, Safety, Anti-cancer compound.

**INTRODUCTION**

Cancer cells are formed from normal cells due to a modification or mutation of DNA or RNA. These modifications or mutations can occur spontaneously (2<sup>nd</sup> law of thermodynamics-increase of entropy) or they may be induced by other factors such as: nuclear radiation, electromagnetic radiation (microwaves, X-ray, gamma rays, UV rays etc), viruses, bacteria and fungi, parasites (due to tissue inflammation or irritation), heat, chemicals in the air, water and food, mechanical cell-level injury, free radicals, evolution and ageing of DNA and RNA etc. All these can produce mutations that may start cancer. Cancer can be therefore, "Entropic disease". Since it is associated with the increase of entropy of the organisms to the point where the organism cannot correct this itself. External intervention is required to allow the organism to return to a stable entropic state.<sup>[1]</sup>

**Cancer:-** (medical term: malignant neoplasm) is a class of diseases in which a group of cells display *uncontrolled growth* (division beyond the normal limits), *invasion* (intrusion on and destruction of adjacent tissues) and sometimes *metastasis* (spread to other locations in the body via lymph or blood). These three malignant properties of cancers differentiate them from benign tumors, which are self-limited and do not invade or

metastasize. Most cancers form a tumor but some, like leukemia, do not. The branch of medicine concerned with the study, diagnosis, treatment, and prevention of cancer is oncology.<sup>[2]</sup>

**TYPES OF CANCER**

**Common Types of Cancer**

Skin cancer is the most commonly diagnosed cancer among men and women. Over one million cases are diagnosed each year, with more young people having skin cancer than ever before.

The most common types of cancer in the United States based on frequency of diagnosis are:

- bladder cancer
- breast cancer
- colon cancer
- endometrial cancer
- kidney cancer (renal cell)
- leukemia
- lung cancer
- melanoma
- non-Hodgkin lymphoma
- pancreatic cancer
- prostate cancer

- thyroid cancer

### Types of Cancer Classified by Body System

Cancer has the potential to affect every organ in the body. The cells within malignant tumors have the ability to invade neighboring tissues and organs, thus spreading the disease. It is also possible for cancerous cells to break free from the tumor and enter the bloodstream, in turn spreading the disease to other organs. This process of spreading is called metastasis.

### Blood Cancer

The cells in the bone marrow that give rise to red blood cells, white blood cells, and platelets can sometimes become cancerous. These cancers are leukemia or lymphoma.

- Lymphoma
- leukemia
- Multiple Myeloma
- Waldenstrom's Macroglobulinemia

### Bone Cancer

Bone cancer is a relatively rare type of cancer that can affect both children and adults. There are several types of bone cancer, but the most common types are:

- Ewing's Sarcoma
- Osteosarcoma

### Brain Cancer

Brain tumors can be malignant (cancerous) or benign (non-cancerous). They affect both children and adults. Malignant brain tumors do not often spread beyond the brain. However, other types of cancer have the ability to spread to the brain. Types of brain cancer include:

- Adult Brain Tumor
- Brain Stem Glioma, Childhood
- Cerebellar Astrocytoma, Childhood
- Cerebral Astrocytoma/Malignant Glioma, Childhood
- Ependymoma, Childhood
- Medulloblastoma, Childhood
- Supratentorial Primitive Neuroectodermal Tumors and Pineoblastoma, Childhood
- Visual Pathway and Hypothalamic Glioma, Childhood

### Breast Cancer

Breast cancer is a common type of cancer that affects women and much less commonly, men. Types of breast cancer include.

- ductal carcinoma in situ
- lobular carcinoma in situ
- inflammatory breast cancer
- Paget's disease of the nipple
- Invasive types of breast cancer

### Digestive/Gastrointestinal Cancers

This is a broad category of cancer that affects everything from the esophagus to the anus. Each type is specific and has its own symptoms, causes and treatments.

- Anal Cancer
- Bile Duct Cancer, Extra hepatic
- Carcinoid Tumor, Gastrointestinal
- Colon Cancer
- Esophageal Cancer
- Gallbladder Cancer
- Liver Cancer, Adult Primary
- Liver Cancer, Childhood
- Pancreatic Cancer
- Rectal Cancer
- Small Intestine Cancer
- Stomach (Gastric) Cancer

### Endocrine Cancers

The endocrine system is an instrumental part of the body that is responsible for glandular and hormonal activity. Thyroid cancer is the most common of the endocrine cancer types and generally, the least fatal.

- Adrenocortical Carcinoma
- Carcinoid Tumor, Gastrointestinal
- Islet Cell Carcinoma (Endocrine Pancreas)
- Parathyroid Cancer
- Pheochromocytoma
- Pituitary Tumor
- Thyroid Cancer

### Eye Cancer

Like other organs in the human body, the eyes are vulnerable to cancer as well. Eye cancer can affect both children and adults.

- Melanoma, Intraocular
- Retinoblastoma

### Genitourinary Cancers

These types of cancer affect the male genitalia and urinary tract.

- Bladder Cancer
- Kidney (Renal Cell) Cancer
- Penile Cancer
- Prostate Cancer
- Renal Pelvis and Ureter Cancer, Transitional Cell
- Testicular Cancer
- Urethral Cancer
- Wilms' Tumor and Other Childhood Kidney Tumors

### Gynecologic Cancers

This group of cancer types affects the organs of the female reproductive system. Specialized oncologists called gynecologic oncologists are recommended for treating gynecologic cancer.

- Cervical Cancer
- Endometrial Cancer
- Gestational Trophoblastic Tumor
- Ovarian Cancer
- Uterine Sarcoma
- Vaginal Cancer
- Vulvar Cancer

### Head and Neck Cancer

Most head and neck cancers affect moist mucosal surfaces of the head and neck, like the mouth, throat and nose. Causes of head and neck cancer vary, but cigarette smoking plays a role. Current research suggests a strong HPV link in the development of some head and neck cancer.

- Hypopharyngeal Cancer
- Laryngeal Cancer
- Lip and Oral Cancer
- Metastatic Squamous Neck Cancer
- Nasopharyngeal Cancer
- Oropharyngeal Cancer
- Paranasal Sinus and Nasal Cavity Cancer
- Parathyroid Cancer
- Salivary Gland Cancer

### Respiratory Cancers

Cigarette smoking is the primary cause for cancer affecting the respiratory system. Exposure to asbestos is also a factor.

- Lung Cancer, Non-Small Cell
- Lung Cancer, Small Cell
- Malignant Mesothelioma
- Thymoma and Thymic Carcinoma

### Skin Cancers

Non-melanoma skin cancer is the most common type of cancer among men and women. Exposure to the UV rays of the sun is the primary cause for non-melanoma skin cancer and melanoma.

- Cutaneous T-Cell Lymphoma
- Kaposi's Sarcoma
- Melanoma
- Merkel Cell Carcinoma
- Non-Melanoma Skin Cancer<sup>[3]</sup>

### CAUSES OF CANCER

- Tobacco
- Genetics
- Environmental factors
- Unsafe sex
- Sun exposure<sup>[4]</sup>

### SYMPTOMS OF CANCER

- Unintentional weight loss

### ALLOPATHIC MEDICINES FOR CANCER

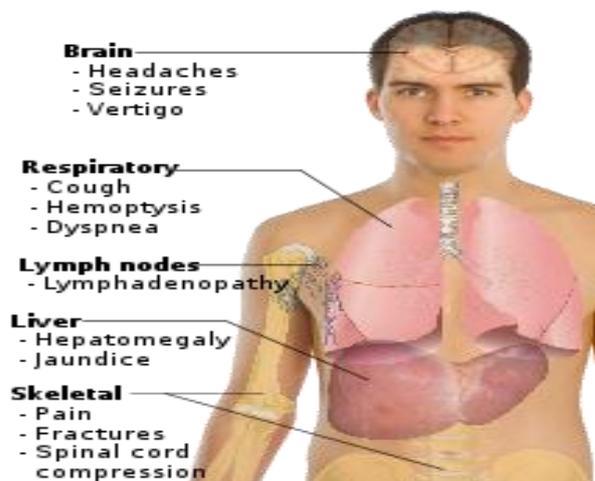
#### ALLOPATHIC MEDICINES USED FOR CANCER AND ITS ADVERSE EFFECTS<sup>6</sup>

ANTICANCER DRUGS	CLINICAL USES	COMMON SIDE EFFECTS OF DRUG
1) Altretamine (hexalen)	Treatment of ovarian cancer	Bone marrow depression, nausea, vomiting
2) Asparaginase	Commonly used in combination with other drugs, refractory acute lymphocytic leukemia	Liver, kidney, pancreas, CNS abnormalities
3) Bleomycin (blenoxane)	Lymphomas, Hodgkin's disease, testicular cancer.	Hair loss, stomatitis, pulmonary toxicity, hyper

- Persistent cough
- Fever
- Changes to the skin
- Pain<sup>[5]</sup>

### SIGNS AND SYMPTOMS

#### Common sites and symptoms of Cancer metastasis



### CANCER TESTS

- C T Scan
- MRI Scan
- Ultrasound Scan
- Bone scan
- PET scan
- Bone marrow test
- Barium x-ray
- Endoscopes
- IVU (Intravenous Urogram) or IVP (IV Pyelogram)
- Lumbar puncture
- Cystoscopy

### TREATMENT OF CANCER

- Surgery
- Radiation therapy
- Chemotherapy
- Hormone therapy
- Immunotherapy

		pigmentation of skin.
4)Busulfan (myleran)	Chronic granulocytic leukemia.	Bone marrow depression, pulmonary toxicity
5)Carboplastin (paraplatin)	Palliation of ovarian cancer.	Bone marrow depression, nausea, vomiting.
6)Carmustin	Hodgkin's disease, brain tumors, multiple myeloma, malignant melanoma.	Bone marrow depression, nausea, vomiting, toxic damage to liver
7)chlorambucil (leukeran)	Chronic lymphocytic leukemia, non-Hodgkin's lymphomas, breast and ovarian cancer	Bone marrow depression, excess uric acid in blood.
8)Cisplatin (platinol)	Treatment of bladder, ovarian, uterine, testicular, head and neck cancers.	Renal toxicity and ototoxicity
9)Cladribine (leustatin)	Hairy cell leukemia	Bone marrow depression,

### ROLE OF PLANTS IN CANCER TREATMENT

Plant materials have been used in the treatment of malignant diseases for centuries; a comprehensive survey of the literature describing plants used against cancer listed over 1400 genera. Recent phytochemical examination of plants which have a suitable history of use in folklore for the treatment of cancer has indeed often resulted in the isolation of principles with antitumour drug, and resins from the root of plants *Podophyllum eardrum* and the related American species, the May-apple have yielded a number of lignans and their glycosides having antitumour activity. Although the major constituents from these two species, podophyllotoxin and the peltatins, are unsuitable for systematic drug use, two semi-synthetic derivatives of podophyllotoxin, etoposide and teniposide, gave particularly good results in clinical trials. Etoposide is currently available for the treatment of small-cell lung cancer, though both compounds have a similar anticancer spectrum. Other podophyllotoxin-related analogues are being developed and tested. Podophyllo toxin itself may be used topically and is most effective in the treatment of venereal warts. From the time of Galen (about AD 180), the juice expressed from woody night shade (*solanum dulcamara*) has been used to treat cancer, tumors and warts and references to its use have appeared in the literature of many countries. The active tumour-inhibitory principle has been identified as the steroidal alkaloid glycoside B-solamarine. Various lichens, e.g.: species of *cladonia*, *cestraria* and *usnea*, also have a history of use in folk medicine against cancer since about AD 970. This all are rich sources of usnic acid, a compound that has been recognized for many years as an antibacterial and antifungal agent, but only more recently

as an antitumour compound. Similarly, many centuries ago, the druids claimed that mistletoe (*viscum album*) could be used to cure cancer; protein fractions with marked antitumour activity have been isolated from mistletoe extract. Mezereum (*daphne mezereum*), despite its toxic properties, has also been used in many countries for the treatment of cancer. The active antitumour constituent of this plant has been identified as a diterpene derivative mezerein, which is structurally very similar to the toxic principle daphnetoxin.

The most successful of higher plant materials used in cancer chemotherapy are the alkaloids of *catharanthus roseus*. Research on this plant, the Madagascan periwinkle, was stimulated by its mention in folklore, not as a cure for cancer, but in the treatment of diabetes. No hypoglycemic activity was detected, but treated test animals became susceptible to bacterial infection, and this led the researchers to undertake extensive examination for possible immunosuppressive principles causing this effects. A no. of bisindole alkaloids showing antileukemic activity have subsequently been isolated and two of this, vinkaleukoblastin (vinblastin) and leurocristine (vincristine), are now extracted commercially from *catharanthus roseus* and used, either alone, or in combination with other forms of therapy for cancer treatment.

Vinblastine is mainly useful in the treatment of Hodgkin's disease, or cancer affecting the lymph glands, spleen and liver. Vincristine is clinically more important than vinblastine and is especially useful in the treatment of childhood leukemia.<sup>[7]</sup>

### LIST OF HERBAL PLANTS USED FOR CANCER<sup>8</sup>

Plant Name	Species Name	Relevant Medicinal Compounds
autumn crocus	<i>Colchicum autumnale</i>	Colchicines
Birch	<i>Betula alba</i>	betulinic acid
Camptotheca	<i>Camptotheca acuminata</i>	camptothecin, topotecan (Hycamtin®), CPT-11 (irinotecan, Camptosar®) 9-aminocamptothecin
Hemp	<i>Cannabis sativa</i>	delta-9-tetrahydrocannabinol (dronabinol, Marinol®)
lapacho tree (pap)	<i>Tabebuia impetiginosa</i> , T.	beta lapachone, lapachol

d'arco)	<i>avellaneda</i> , <i>Tecoma curialis</i>	
Mayapple	<i>Podophyllum peltatum</i>	podophyllotoxin, etoposide, podophyllinic acid, teniposide
nothapodytes tree	<i>Nothapodytes fêted</i>	acetylcamptothecin, camptothecin, scopolectin
Periwinkle	<i>Catharanthus roseus</i>	vinblastine (Elba®), vincristine (leurocristine, Oncovin®), vindesine (Eldisine®, Files®), vinorelbine (Navelbine®)
yew, English	<i>Taxus baccata</i>	docetaxel (Taxotere®)
yew, Pacific	<i>Taxus brevifolia</i>	paclitaxel (Taxol®)

### UNCONVENTIONAL CANCER TREATMENT

In recent years, some aspects of traditional Chinese medicine involving herbal medicine, acupuncture, Qi gong, and other practices, have become more popular in the United States and are used to treat a wide variety of conditions. U.S. cancer patients who use traditional Chinese medicine do so mainly for pain control, reduction in side effects of conventional treatment, and enhanced quality of life, in the opinion of several members of the Advisory Panel for this project. Some of the herbal products used in traditional Chinese medicine are sold in U.S. health food stores and by specialty supply companies. In China and Japan, where traditional Chinese medicine and, particularly, herbal medicine, is used in primary antitumor treatment, herbal products are the subject of much scientific research concerning their role in host support, e.g. as enhancers of immune function. Most of the recent scientific literature on immune-stimulating effects and adjunctive therapeutic use of herbal medicine in cancer treatment has been published by researchers in China, Japan and Korea.<sup>[9]</sup>

Higher fungi, including both edible and inedible mushrooms, are some of the major sources of polysaccharides and other substances that have been studied for antitumor and immunologic activity and as potential sources of new anticancer drugs. Many types of fungus are used medicinally in China and Japan to stimulate host defenses and to enhance patients' overall health. One of the most extensively studied mushrooms is the shiitake (*Lentinus edodes*), a popular edible mushroom in Japan. Lentinan, a polysaccharide isolated from extracts of the shiitake, has shown antitumor activity in a variety of animal tumor tests and has shown a variety of immune-altering functions, e.g., as a restorer or potentiator of T-lymphocyte activity, with no direct cytotoxicity. Another example includes extracts from the underground tuberlike growths (sclerotia) of *Polyporus umbellatus*, an edible mushroom that grows wild on tree stumps. Studies have shown that a polysaccharide found in extracts of *Polyporus umbellatus* increases cellular and humoral immunities in experimental animals, is active in experimental tumor systems, and may potentiate the effects of chemotherapy. Other fungi studied for immunologic and antitumor effects include *Coriolus versicolor*, from which the polysaccharide Krestin is derived and the enokidake fungus (*Flammulina*

*velutipes*). Clinical studies in Japan and China have also examined the potential for using extracts of some fungi in conjunction with conventional cancer treatment.

This chapter summarizes the available information on five of the most widely used unconventional treatments based on herbal substances (presented in alphabetical order). These include single agent treatments, such as teas brewed from chaparral and Pau d'Arco, and mixtures of herbal products sold as proprietary treatments -- Hoxsey products, Iscador (preparations of mistletoe) and Essiac treatments.<sup>[15]</sup>

#### Chaparral

Chaparral tea has reportedly been used in folk remedies for leukemia and cancers of the kidney, liver, lung, and stomach. It is reported to have been popular among American Indians of the southwest as a remedy for a wide variety of disorders in addition to cancer, such as arthritis, venereal disease, tuberculosis, bowel cramps, rheumatism, colds and bronchitis. Chaparral tea is claimed to have a variety of medicinal qualities -- it has been described as an analgesic, an expectorant, an emetic, a diuretic and an anti-inflammatory substance.

Chaparral tea is prepared from the leaflets and twigs of *Larrea divericata* Coville and/or *Larrea tridentata* Coville, also known as the creosote bush, which is indigenous to the desert areas of the southwestern United States. According to one report, the tea is made by steeping about seven to eight grams of dried leaves and stems of chaparral per quart of hot water.<sup>[10]</sup>

A number of chemicals, e.g., gums and resins, have been isolated from the creosote plant. Studies of its biological activity have focused on one of its main components, nordihydroguaiaretic acid (NDGA), a chemical with antioxidant properties that has been used widely in the food industry as a preservative. A 1969 report by Smart and colleagues summarizing the available scientific data on NDGA noted that in vitro tests revealed a "virtual complete inhibition of aerobic and anaerobic glycolysis and respiration with dilute suspensions of Krebs 2 ascites, Ehrlich ascites and leukemia L1210 cells." Some in vitro studies reported that NDGA was associated with stimulation of tumor cell growth and stimulation of respiratory enzyme activity at low concentrations, though

those same processes were inhibited at higher concentrations of NDGA. It has also been reported that under certain conditions, NDGA can bind to DNA and can suppress certain immune responses in cultured mouse cells.

### Essiac

Essiac is an herbal preparation used in Canada as a treatment for cancer, which is reported to have originated in Indian folk medicine. From the 1920s until the late 1970s, Essiac was made available to cancer patients by Rene M. Caisse, a nurse who developed the treatment while working at a medical clinic in rural Ontario and who became its sole proprietor. Shortly before her death in 1978, Caisse turned over the Essiac formula, along with rights to its name and manufacture, to the Resperin Corporation of Ontario, the company currently providing Essiac to patients in accordance with a special agreement with Canadian federal health officials.<sup>[11]</sup>

### Components of Essiac

Several reports specify four herbal ingredients in Essiac: Indian rhubarb (*Rheum palmatum*), sheepshead sorrel (*Rumex acetosa*), slippery elm (*Ulmus fulva*) and burdock root (*Arctium lappa*). None of these reports indicates how or when these ingredients were identified, although one cites personal communication from the Resperin Corporation. No information is available on the amount of each ingredient or the method of preparation, since Resperin considers the formula proprietary.

### Hoxsey Treatment

The Hoxsey treatment involves several herbal preparations, all of which are made from combinations of herbs and inorganic compounds.

According to Hoxsey's autobiographical book *You Don't Have to Die*, the herbal formula for the Hoxsey treatment was developed in 1840 by John Hoxsey, Harry Hoxsey's great-grandfather.<sup>[12]</sup>

### Components of the Treatment

Hoxsey's treatment regimen included his internal and external preparations and "supportive treatment," although the components of the latter are not specified in his book (418). His preparations included a paste or salve applied topically for external cancers, a powder, pills, and a dark brown herbal tonic taken orally. Hoxsey adjusted the composition and dose of each patient's formula, depending on the individual patient's general condition, the location of the cancer, and the extent of previous treatment. The internal treatment was taken by mouth as a liquid tonic or in pill form. Hoxsey's 1956 book *You Don't Have to Die* lists the ingredients of his internal treatment given in "all cases of cancer, both internal and external" as potassium iodide combined with some or all of the following substances, on a case-by-case basis: licorice, red clover, burdock root (*Arctium lappa*), stillingia root (*Stillingia sylvatica*), berberis root (*Berberis vulgaris*), poke root (*Phytolacca Americana*),

*cascara* (*Rhamnus purshiana*), Aromatic USP 14 (artificial flavor), prickly ash bark (*Zanthoxylum americanum*) and buckthorn bark (*Rhamnus frangula*). The last two substances in this list are not specifically mentioned in Mildred Nelson's list of ingredients used in the Hoxsey treatment she currently offers.

Hoxsey's escharotic preparations, which were applied locally in "external cases," included a yellow powder, a red paste and a clear solution. He reported that his yellow powder contained arsenic sulfide, talc, sulfur and what Hoxsey called a "yellow precipitate". The caustic red paste reportedly contained antimony trisulfide, zinc chloride, and bloodroot (*Sanguinaria canadensis*). The clear solution contained trichloroacetic acid.<sup>[13]</sup>

### Antitumor Effects of the Hoxsey Components

Many of the constituent herbs in the Hoxsey treatment have a long history of folk use in the treatment of cancer, as well as for a variety of other conditions. One of the constituents of the external treatment, bloodroot (*Sanguinaria canadensis*), e.g., was used by Native Americans to treat cancer, warts and nasal polyps.

The ingredients used in Hoxsey's external paste -- zinc chloride, antimony trisulfide, and bloodroot -- were used by Frederic Mohs, MD, of the University of Wisconsin Medical School in the 1930s and 1940s to treat nonmelanoma skin cancer, e.g., invasive basal cell carcinoma. The Mohs chemosurgical technique, as it came to be known, used the caustic paste to permit serial microscopic examination of excised tissue. Mohs's preparation, which he referred to as a zinc chloride fixative, reportedly contained 40 grams of stibnite (antimony trisulfide in a metallic base), 10 grams of powdered sanguinary and 34.5 cc of a saturated solution of zinc chloride. In this method, dichloroacetic acid was first applied to the skin covering the tumor, followed by application of the caustic paste to kill and fix the tissue, and left in place under a bandage for 24 hours, during which time the patient was given analgesics for pain. Twenty-four hours later, a layer of tissue approximately five millimeters thick could be excised with a scalpel, a procedure involving no pain or bleeding and then examined microscopically. Several successive applications of fixative, excisions and microscopic observation were performed until the tumor was removed.

**Cascara**:- also contains aloe-emodin and emodin, which have shown antitumor activity in animal tests systems. No antitumor activity was found when a powdered plant suspension of cascara was tested in the Sarcoma 37 system NCI tested cascara 16 times and found no antitumor activity.

### Barberry

Two studies have reported antitumor effects of substances isolated from barberry. NCI reported one test of barberry, which showed no antitumor activity.

**Licorice** -- One study reported that licorice was inactive in the Sarcoma 37 test system. NCI tested licorice 19 times, with one sample showing activity that was not considered significant. Benzaldehyde and a number of other components (e.g., fenchone, glycyrrhizin, indole, quercetin, and beta-sitosterol) have been isolated from licorice and found to be active in animal test systems.

**Red Clover**:- Red clover showed no activity when tested in the P388 system. NCI tested red clover 94 times, with one test showing activity that was not considered significant.

**Pokeroot**:- One published study reported no significant antitumor activity of pokeroot in three animal test systems (Ehrlich ascites, Leukemia SN36, and Sarcoma). A component of pokeroot is well known, however, for its ability to induce the proliferation and differentiation of lymphocytes in the blood, a property that might be relevant to an immunologic response to cancer but which might not be picked up as positive activity in these animal tumor models. NCI tested pokeroot for antitumor activity 43 times; in one of these tests, activity was reported in the Walker 256 system, but this test system was later withdrawn because of problems with its validity.

**Prickly Ash**:- No tests for antitumor activity of prickly ash have been reported in the literature, although some of its components (e.g., chelerythrine and nitidine) have tested positive in animal systems. NCI tested this plant for antitumor activity 5 times, with no positive results.

**Stillingia**:- No tests of stillingia have been reported, although one of its constituents (gnidilatidin) has tested positive in animal systems. NCI has no record of testing it for antitumor activity. Taken together, the data indicate that many of the herbs used in the Hoxsey internal tonic or the isolated components of these herbs have antitumor activity or cytotoxic effects in animal test systems. The complete Hoxsey herbal mixture has not been tested for antitumor activity in animal test systems, with human cells in culture, or in clinical trials, however. It is unknown whether the individual herbs or their components that show antitumor activity in animals are active in humans when given in concentrations used in the Hoxsey tonic. It is also unknown whether there might be synergistic effects of the herbs used together.<sup>[15]</sup>

**Mistletoe**:- Mistletoe has long been used in the treatment of a variety of acute and chronic conditions. Mistletoe preparations are available in a variety of forms, including a preparation by the trade name Plenosal, but the oldest and most widely used is a product marketed by Weleda AG (Switzerland and West Germany) under the trade name Iscador, which consists of fermented extracts of mistletoe, some forms of which are combined with small amounts of various metals (e.g., silver, copper and mercury).

cite a number of conditions, some of which are associated with an increased risk of cancer, that are treated with Iscador in an attempt to prevent their development into tumors.

#### Effects of Iscador treatment

The immediate physiologic effects of Iscador reportedly include a rise in body temperature and an increase in the number and activity of circulating white blood cells. Several clinical studies of the fermented form of Iscador have noted that patients experience moderate fever (a rise of 2.3 to 2.4°C) on the day of the injections and in some cases local reactions around the injection site temporary headaches, and chills associated with the fever. Clinical effects of the unfermented form of mistletoe treatment have not been reported. Iscador treatment is also claimed to improve patients' general conditions, even after all other treatment options have been exhausted, and to enhance hormonal and enzyme activities (particularly, by improving thyroid and reproductive organ function), promote deeper sleep, improve appetite, relieve tension and depression, increase initiative, regulate bowel movements, and increase functional capacity.

#### Mode of Action

The current Anthroposophic literature describes Iscador as having a unique comeadow saffron or autumn crocus, perennial garden ornamental (*Colchicum autumnale*) of the family Liliaceae (lily family). Native to Europe and N Africa, it has escaped from gardens to meadows and fields in some parts of the United States. Its poisonous corms and seeds were the source of the drug colchicines. The purplish flowers, which bloom in the fall when the leaves are gone, resemble those of the true crocus and true saffron (of the iris family) but have six stamens instead of three. Other species of *Colchicum* are also popular garden plants. Meadow saffron is classified in the division Magnoliophyta, class Liliopsida, order Liliales, family Liliaceae, order of cytostatic (suppression of cell multiplication and growth) and immune stimulating properties. Its cytostatic properties are thought to derive from its constituent proteins, some of which are reported to act specifically against malignant cells. One type of protein found in mistletoe (viscotoxin), for example, is reported to destroy cancer cell membranes in cell culture. Another type (lectin) is reported to inhibit the growth of proliferating cells by blocking the synthesis of particular proteins at the ribosomal level. Iscador's immune stimulating properties reportedly include the ability to increase the number and activity of certain types of immune cells and to promote specific immune defense mechanisms leading to increased production of lymphocytes.<sup>[16]</sup>

#### REFERENCES

1. Mieszkowski, M.R, cancer-A biophysicist's point of view by Merck Ronald- M.Sc, PhD, Digital recordings, 2006.
2. <http://en.wikipedia.org>.

3. <http://cancer.about.com>.
4. [www.greatqualityinfo.com](http://www.greatqualityinfo.com).
5. [www.cancerproject.org](http://www.cancerproject.org).
6. [www.healthline.com](http://www.healthline.com) Evans.
7. Evans.W.C., Trease and Evans Pharmacognosy, 15<sup>th</sup> edition, Elsevier publications, 2006; 394-406.
8. <http://biotech.icmb.utexas.edu/botany/acrohst.html>.
9. Plants used in cancer treatment by Estelle Levetin.
10. [www.wikipedia.com](http://www.wikipedia.com).
11. Kumar, N., Taxol-induced polymerization of purified tubulin, Journal of biological chemistry. 1981, 256 (20), 10435-10441.
12. British national pharmacopoeia.
13. <http://www.encyclopedia.com:/1E1-meadowsa.html>.
14. deaths sound an Rx alert, the Portland tribune, apr20, 2007.
15. <http://miracleii-4u.com/ufucoidam/html>.
16. Grieve, M., A modern herbal. Miniola, N.Y, dover publications, 1971; 547-548.