

## Pharmacologic evaluation of some anti-cancer plants in China and its clinical use of traditional Chinese medicine

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### Abstract

Many plant species are used in China in traditional medicine for the prevention and treatment of cancer. This paper presents some of these species with details on other pharmacologic evaluation and its traditional Chinese medicinal uses. The known bioactivities and some chemical constituents of each of the species given. Information on bioactivities of each species resulting from tests on experimental animals are given. Many of the known chemical constituents of each species are given.

Various species of plants effective for various types. In this meeting I will present on some antitumor of the plants which are as follows; (1) *Akebia trifoliata*(Thunb.)Koidz. ((2) *Panax notoginseng*(Burk.) F, H, Chen., (3)*Ziziphus jujuba* Mill., (4)*coriolus versicolor*(Fr.)Que l., (5)*Trichosanthes kirilowii* Maxim., (6) *Ficus carica* Linnaeus., (7) *Acanthopanax senticosus*(Rupr.et Maxim.)Harms., (8) *Hibiscus mutabilis* Linnaeus., (9) *Arctium lappa* Linnaeus., (11) *Agrimonia pilosa* Ledebour and (12) *Hedyotis diffusa* Willd.

## Introduction

Cancer are the worst enemy endangering the lives of human beings. At present, each of the cancer therapies such as the surgical, chemical, radiative and immune, has its own indications and contraindications, because of the variations in pathology, location and progressive stage of cancers. Generally speaking, combined therapies, that is to say, integrated Western and traditional Chinese medicine and combined external and internal therapy, have proved to be relatively satisfactory. In accordance with these principles, Songhua Hospital of Shanghai Traditional Chinese Medical College treated 300 cases of primary cancer simply with medicinal herbs and the total effective rate was found to be 51%, with the longest survival period being 11 years. Judged by pathological classification and observation at different stages, squamous cancer had the highest effective rate -55, 86%. In addition, the hospital selected 60 patients with advanced squamous cancer and randomly divided them into two groups of 30 patients, a group treated with traditional Chinese medicinal herbs and a group treated with chemotherapy. The survival period of the herbal group was 465 days while that of the chemotherapeutic group was 204 days, and the survival rate after 12 and 24 months were 66, 7% and 13, 3% for the herbal group and 33, 3% for the chemotherapeutic group respectively. Based on the above facts, I think that treatment of cancer with traditional Chinese medicine has boundless prospects.

Chinese materia medica is the natural therapeutic agent used under the guidance of the theories of traditional Chinese medicine. Its sources are mainly from plants, some from animals and minerals, and a few from chemical drugs and biologic products.

It has been more than two thousand years since the publication of the first treatise of Chinese pharmacy-" Shennong's Herbology of Chinese Materia Medica". Now no less than one thousand works on Chinese materia medica have been published, which have played an important role in the prevention and treatment of disease in China and other countries. Nowadays more and

more countries pay attention to Chinese traditional medicine and pharmacy, In the last one hundred years, although western medicine has developed rapidly and superseded the national and folk medicines of most countries, Chinese materia medica still stands steadily in the pharmaceutical field in the world and has demonstrated its great vitality because of its firm clinical foundation, significant therapeutic effects and specific system of theory based on clinical practice. In the long history of its development, Chinese materia medica has absorbed the virtues of national and folk medicines from other countries, and from western medicine as well, and has consequently been enriched and perfected. Now it is developing more rapidly than at any time in the past.

### **The medicinal plants used for anti-cancer in China**

#### **1 *Akebia trifoliata*(Thunb.)Koidz., *A. quinata*(Thunb.)Decne. Family *Lardizabalaceae***

Caulis of *Akebia*, which contains akebin that can be hydrolyzed into hederagenin, oleanolic acid, glucose and rhamnose. Both its fruit and seed are anti-cancer drugs. Fruit of *Akebia*, which mainly contains sugar.

The fruit is found active in inhibiting sarcoma-180 and sarcoma-37 in rats. The inhibitory rate of the herb on JTC-26 is 50 to 60 per cent.<sup>1)</sup>

The experimental formulas, for cancer of the stomach. the decoction of the following herbs was indicative for the disease: Fructus *Akebiae* 30g, Folium *Cycadis Revolutae* 30g, Herba *Hedyotis diffusae* 30g, Herba *Scutellariae* 30g, Nidus *Vespae* 9g, Rizoma *Atractylodes macrocephalae* 9g, Pericarpium *Citri reticulatae* 9g<sup>2)</sup> For cancer of the Liver:

Chang Minyi reported that the herb is mainly indicative for tumors of the digestive tract, but when combined with other anticancer drugs, it is also indicative for other types of cancer. According to Treatment and Prevention of Common Types of Cancer in Qinghai, taking 60 grams of each of Fructus

Akebiae, Rhizome Rhodomyrti Tomentosae and Hedyotis Diffusae daily in decoction is effective for chorioepithelioma. The author has also found that, as an adjuvant, 20 grams of Fructus Akebiae and 4 grams of Radix Ginseng, when cooked together with rice into gruel, can modify the symptoms of cancer patients if taken daily.<sup>4)</sup>

## 2. *Panax notoginseng*(Burk.)F.H.Chen. Family Araliaceae*Panax notoginseng*

The root in Chinese ethnopharmacology is used to treat cancer, which grows in Guanxi and Yunnan provinces contains Arasaponin A, Arasaponin B, in the former case that can be hydrolyzed into arasapogininA and glucose, a later case, that can be hydrolyzed into arasaponigenB and glucose.

In tests with phagological scaaing for anticancer drugs, the herb was found antiphagologic. The hot water extract of the herb inhibits cancer effectively with an inhibitory rate of over 90% on JTC-26 in vitro. Experiments in vivo showed that the herb also inhibits sarcoma-180 in mice with sarcoma-180 were fed with glucose derived from the herb with a dose of 2.5mg per kilo of thir body weight and after two weeks, the size of the tumor mass became reduced and after five weeks, the tumor mass disappeared completely in six out of ten mice.

Collection of Proved Recipes in Anhui Province recommends the powder of the following herbs for oral administration with honey water three times a day and each time 6 grams: Radix Notoginseng 18g. Rhizoma Pleionis 120g. Sargassum 60g. Bulbus Fritillariae 60g. Pruina Kaki 60g. Prepared Rhizoma Pinllae 30g. Flos Carthami 30g. Prepared Resina Olibani and Myrrha 15g

Yunnan Pulvis Medicinalis Albus, a white medicinal powder consisting of pulverized notoginseng root and other ingredients, has been proved to inhibit sarcoma-180 in rats.

### 3. *Ziziphus jujuba* Mill, Family *Rhamnaceae*.

The fruit are used intradional medicine of Chinese to treat cancer, It has many varieties, but the red ones are used as a herb. Among the chemical constituents are pentacyclic triterpenoides oleanolic acid, dammarane triterpenoids, zizybeoside, flavanone glycosides, scopoletin and cyclic AMP. The fruit contains a lot of cAMP and cGMP, hence it is thought that the herb can promote immunity.

The intensity of its inhibition is closely related to its dose. Intense inhibition occurs to rats only when its concentration reaches  $500\mu\text{g}/\text{ml}$ . No inhibition takes place when the cocentration is less than  $100\mu\text{g}/\text{ml}$ . Tests in vitro proved that the hot water extract of the herb has inhibition on the growth of JTC-26 with a rate of 90%, and it has also been found that the herb has a slight inhibition on the normal cells.

Experimental formulas for cardiac cancer: Zhi Zhi Prescriptions reported " Get a date and have its core removed, then insert the body of a mylabris (without its head and wings ) into the date and have it roasted. The body of the mylabris is removed away before eating the processed date on an empty stomach, "The formulas for spitting blood in lung cancer: Equal portions of FruTctus *Ziziphi jujubae*(burned) and *Galla Chinensis* (processed) with tea through fermentation) are ground into powder and taken 10 grams each time with rice porridge.

In 1981 Journal of Medicinal Plants reported that dates exported from China is rich in cAMP with a dried cocentration of 100 to  $500\mu\text{g}$  per gram. A Japanese scholar pointed out at the 15th Symposium on Chinese Medicinal Herbs that: "Cancer cells, containing low cAMP, may change to normal cells when cAMP is effused into them during culture." Undoubtedly, it is of benefit to increase the use of *Fructus Ziziphi Jujubae* in anticancer prescriptions.

#### 4. *Coriolus versicolor*(Fr.)Quél. Family *Polyporaceae*

The whole sporophore or mycelium are used for treatment of cancer. Among the chemical constituents are coriolan, PS-K(Protein-bound polysaccharide), ATSO.

Coriolan obtained from the mycelia of the herb has a strong action against cancer, even stronger than ATSO and the coriolan obtained from *Ganoderma lucidum* and *Polyporus umbellatus*. It inhibits mice sarcom-180 with a 99% effective rate and reduces tumor mass with a 100% effective rate. PS-K has been proved to resist cancer through reinforcing the specific immunofunctions of the tumor. The drug inhibits many tumors of experimental animals, specific immunofunctions of the tumor. The drug inhibits of experimental animals, such as cervical cancer-14, mice sarcoma-180, ascites cancer, adenocancer-755, lympholeukemic cell-7212 and lympholeukemic cell-388.

The Chinese medicinal formulas for malignant tumor: 3 to 6 grams of PS-K is taken orally each day. The *Coriolus* polysaccharides Injection is administered intramuscularly 40 grams a time and twice a day. 4 weeks will be a course of treatment and between two courses there is a 2 week interval. Or 120-160mg of the injection mixed with 300ml of 10% glucose is administered intravenously each day. This treatment may be continued for 10 days and, after 1 or 2 weeks of interval, renewed for 10 more days.

#### 5. *Trichosanthes kirilowii* Maxim. family *Cucurbitaceae*.

The root are used in traditional medicine of Chinese to treat cancer. Among the chemical constituents are steroids, triterpenoids, cucurbitacin, citrulline, trichosanic acid. The important effective element is glucoprotein.

Its anticancer mechanism lies in: Causing necrosis to trophocytes and interfering the respiration and anaerobic glycolysis of the cancer cells. The extract from the drug cures chorioepithelioma with a rate of 50% and malignant hydatidiform mole with a rate of 100%. It increases leucocytes,

but has no side effect on the liver and the kidney. The drug inhibits cervical cancer-14, sarcoma-180 and ascites cancer. The drug inhibits JTC-26 with a 90% effective rate.

Chinese medicinal formulas for mammary cancer: Radix Trichosanthis 30g, Concha Ostrae 30g, Spica Prunellae 30g, Sargassum 9g, Thallus Laminariae seu Eckloniae 9g, Nidus Vespae 9g, Radix Scrophulariae 3g, Bulbus Bolbostemme 15g, Scolopendra 2g. The prescription is taken one dosage a day in decoction.

#### 6. *Ficus carica* Linnaeus. Family *Moraceae*

The fruit, root and leaves are used in traditional medicine to treat cancer. Among the chemical constituent are glucos, fructose, citric acid, fumaric acid, chemical constituent are glucose, fructose, pyrrolidine carboxylic acid, shikimic acid, auxin. In the dried and immature fruit, which contains antineoplastic agents. In addition to its medicinal functions, Fructus Fici is edible because it is sweet in taste.

The juice extracted from its immature fruit inhibits transplanted sarcoma-180 in rats, spontaneous mastocarcinoma of mice and causes necrosis of the tumor. It may as well delay the growth of transplanted adenocarcinoma, myeloid leukemia and make the tumor degenerate. The juice of the whole plant, injected into guinea pigs, has an inhibitive effect on the transplanted sarcoma-180. The drugs of the water extract of the dried fruit precipitated with acetone has an active action against Ehrlich's sarcoma.

The Chinese medicinal formulas for cancers of the stomach and the bowel: Five pieces of the fresh fructus Fici are eaten or a decoction of 20 grams of the dried fruit is taken after meals every day. For esophageal cancer: Fresh fructus Fici 500 grams is stewed with lean meat 100 grams for half and both the broth and the meat are taken altogether.

7. *Acanthopanax senticosus*(Rupr. et Maxim.)Harms. Family. *Araliaceae*.

The cortex are used in Chinese traditional medicine to treat cancer. Among the chemical constituents are daucostrol, 7-hydroxy-6, 8-dimethoxycoumalin- $\alpha$ -glucosid, ethl- $\alpha$ -galactoside, syringin, sesamin and polysaccharide.

Cortex *Acanthopanax* strengthens human body defensive function against pathogens and promotes resistance against harmful stimulants (chemical, physical and biological) from the natural environment. It has been proved that oral administration of Cortex *Acanthopanax* can help human body produce large quantities which are of significant importance for the immunity to cancers and for the increase of leukocytes. The alcohol extract of cortex *Acanthopanax* has an inhibitory rate of 40, 2-68, 0% against solid Ehrlich's ascites carcinoma and sarcoma-180 in rats. In Japan, tests in vitro with cortex *Acanthopanax* revealed that the hot water extract of the drug had an inhibitory rate of over 90% on JTC-26.

The Chinese medicinal formulas for cancer of the stomach: The extract of cortex *Acanthopanax* is processed into pills containing 1, 5 gram of the crude drug each and 3 pills are taken each time, 3 times daily. The drug also prevents and treats bone marrow arrest due to chemotherapy.

8. *Hibiscus mutabilis* Linnaeus. Family *Malvaceae*.

The flower, leaves or root are used in traditional medicine of China to treat cancer. Its leaves contain flavonoid glycosides, amino acid and tannic substances. Drug sensitivity tests showed that the herb was sensitive to stomach cancer cells.

Experimental formulas for lung cancer.: *Folium Hibisci mutabilis* 30g, *Folium Cordylini fruticosae* 30g, *Herba Euphorbiae lunulatae* 15g



#### 9. *Arctium lappa* Linnaeus. Family *Compositae*

The fructus are used in Chinese traditional medicine to treat cancer. Among the chemical constituents are arctin, fatty oil, gobosterin, lappaol, vitamin A and B. Arctin can be hydrolyzed into arctigenin and glucose.

A culture solution was prepared with JTC-26 ( $1 \times 10^5$ /ml), 90% of Eris' solution and 10% of embryo serum of calf. Then the hot water extract of *Fructus Arctii* was added and the concentration was adjusted to 500mg/ml, with each plate containing 25ml of the mixed solution. The medium was kept under 27°C for 134 hours and the result showed that the drug inhibits the proliferation of cancer cells of JTC-26 with a rate of 90%.

The Chinese formulas for various types of cancer: (1) 7 fructus *Arctii* is decocted in 1000ml of water and the decoction is divided into 3 portions to be taken in the morning, afternoon and evening. (2) *Herba Arctii*, *Radix Rumei*, *Obtusifolii* and *Rhizoma Smilacis Chinae* are prescribed for oral administration, and it is very effective.

#### 10. *Artemisia argyi* Leveille et Vaniot. Family *Compositae*.

The leaves are used in Chinese traditional medicine to treat cancer. Among the chemical constituents are adenine, choline, cineole, thujone, phellandrene, cadinene, thujyl alcohol. *Artemisia vulgaris* L. was found to have an inhibitive action on Hela-cells and on many types of transplanted tumors. Bacteriophagic screening method for anticancer drugs confirmed that the herbs has an antiphagic action.

The Chinese medicinal formulas for tumor of the thyroid: The leaves is blended with wheat flour to make cakes for eating frequently. The preparation of *Artemisia argyi* have been used in the management of cancers of the digestive system and the breast, with an overall effective rate of 55%. It is believed that herb can relieve and improve the symptoms of the patients and prevent deterioration of their conditions.

### 11. *Agrimonia pilosa Ledebour*. Family *Rosaceae*.

All plants are used in traditional medicine to treat cancer. Among the chemical constituents are agrimonolide, Vanilic acid, Taxifolin, Ellagic acid, Triterpenoids, Hecaoferin, Agrimophol, Agrimol, Luteolin-7- $\beta$ -D-Glucoside, tannin substance.

With HeLa-cells aggregation method, a cytotoxic substance has been found in the root of *Herba Agrimoniae*, which is soluble in methanol and ether and is extremely active in the inhibition of HeLa-cells aggregation. With an intraperitoneal administration of 100 mg/kg of body weight to mice implanted with sarcoma-180, the inhibition rate was calculated to be 18, 5% for the hot water extract and 7, 4% for the alcohol extract. A daily oral administration of 1000mg/kg of body weight to guinea pig implanted with sarcoma-180 for successive 12 days, showed an inhibition rate of 37, 24% on tumors. Under a content of 500 $\mu$ g/ml, the herb did not cause damage to but, on the contrary, aid in the growth(100%) of normal cells, i.e., an action of reinforcing the body resistance. An inhibition rate of 100% on JTC-26 was obtained through experiments in vitro. The methanol extract of the root exhibited a strong action against HeLa-cells aggregation.

The Chinese medicinal formulas for pains due to various types of cancer: *Herba Agrimoniae*(120g) is decocted in water for 1, 5 hours and the filtered liquid is steamed dry. The powder is taken with boiled water 6 times in 24 hours, and 45 days make a therapeutic course. This formula has been used by the author for many years and it takes effect 15 days after administration and is particularly effective for cancers of the bone, the liver and the pancreas with severe pain.

### 12. *Hedyotis diffusa Willd.* Family *Rubiacaceae*

In Chinese ethnopharmacology, this whole plant is used to treat cancer. The plant is distributed over areas south of the Yangtze River. The herb was not recorded in ancient literatures and first appeared in Herbal Records of

Guangxi published after 1949. The herb is low toxicity, with a half lethal dose of 104 grams of the crude drug per kilograms of the body weight when injected intraperitoneally to rats. At Changning Central Hospital in Shanghai, 36 patients with liver and stomach cancer were treated with the herb and the result was remarkably effective in 4 cases and effective in 10 cases. Among the chemical constituents are ursolic acid, oleanolic acid p-coumaric acid, stigmasterol,  $\beta$ -sitosterol, erysimoside and hentriacontane.

The herb functions to promote the proliferation of the reticuloepithelial system, the formation of antibodies and the phagocytic power of leucocytes. Methylene-blue tube method in vitro (corresponding to 6g/ml of crude drug) proved that the drug has strong inhibition acute lymphatic, granulocytic, monocytic and chronic granulocytic leukemia.

The Chinese medicinal formulas for cancer of the stomach: A decoction of *Herba Hedyotis diffusae* (90grams), *Rhizoma Imperatae* (60grams) and certain amount of white sugar is taken daily.

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