

# Research Progress of Anti-lung Cancer Drugs

Ke Lin

Jiamusi University, Jiamusi, 154007, China  
lk13421869069@163.com

## ABSTRACT

Lung cancer is the highest incidence of a disease and mortality in China. The incidence of a disease and mortality of lung cancer in China is among the highest in the world, and the probability of survivability is lower than other countries. However, there are still some practical issues in clinical practice, such as large toxic side effects of chemotherapeutic drugs, drug resistance, and fewer people who benefit from immunotherapy. Therefore, this paper aims to find a more safe, effective and reliable combination of drugs. In this paper, through reading, searching and screening a large number of basic and clinical studies, it is concluded that traditional Chinese medicine can not only play an anti-tumor effect through a variety of ways, but also prolong the survival period of patients with cancer and improve the quality of life of patients. In this paper, *Astragalus membranaceus* and *Glycyrrhiza uralensis* Fisch are selected as the legume of anti-lung cancer drugs. The effective components, pharmacological activity properties, anti-lung cancer mechanism and clinical application of treatment of lung cancer of *Astragalus membranaceus* and *Glycyrrhiza uralensis* Fisch are systematically combed in order to provide theoretical basis for the treatment and prevention of lung cancer.

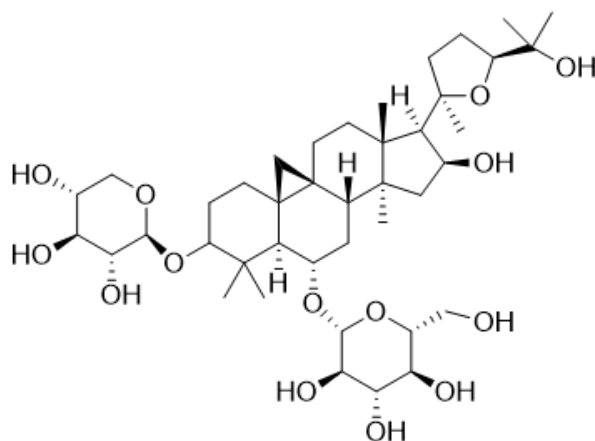
## KEYWORDS

*Astragalus* and *Glycyrrhiza uralensis* Fisch; An anti-tumor drug for lung cancer

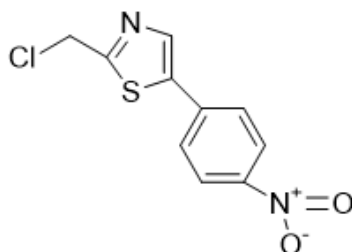
## 1. INTRODUCTION

The first cause of lung cancer is smoking. As many as 69 kinds of compounds with carcinogenic activity are identified in the chemicals produced by tobacco combustion. The second is occupational exposure, which refers to the process in which specific occupations are more susceptible to cancer induced by physical and chemical stimuli at work. The third is air pollution, which is aimed at lung cancer caused by the environment, such as kitchen fumes and indoor coal burning. The fourth is the diet problem, rarely eat vegetables containing B-haloplin. A lack of B-carotene, which is necessary to make vitamin A, can lead to a lack of vitamin A, which can lead to squamous cell formation in the airways. This is thought to be the beginning of lung cancer [1]. *Astragalus membranaceus*, a legume plant, has a rich history of application in the prevention and treatment of tumors and related diseases. As the active component of *astragalus polysaccharide* is the main biological macromolecule besides protein and nucleic acid, it has rich biological active function, and its anti-tumor effect has the characteristics of multi-target and multi-pathway [2]. Modern pharmacology has confirmed that there are abundant active components in *Astragalus membranaceus* [3]. The chemical constituents of *Astragalus membranaceus* are mainly divided into three categories: polysaccharides, saponins and flavonoids. At present, the anti-tumor components of *Astragalus* are mainly *astragalus saponins* and *astragalus polysaccharides*. *Astragalus glycoside IV* is the most bioactive component of *astragalus saponins*, and *astragalus polysaccharides* is the most bioactive component derived from the dry root of *Astragalus membranaceus* [4].

The following Figure 1 and Figure 2 are the chemical molecular structures of astragaloside IV and astragalus polysaccharides:



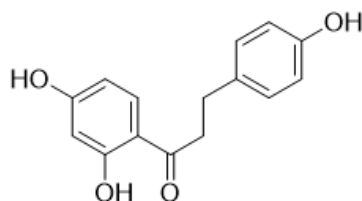
**Figure 1.** The molecular structure of Astragaloside A



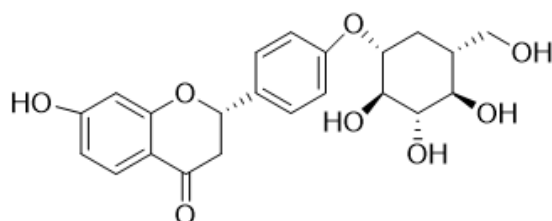
**Figure 2.** The molecular structure of Astragalus polysacchararin

*Glycyrrhiza uralensis* Fisch is a perennial herbaceous plant of Leguminosae and is a traditional Chinese herbal medicine in China. It is found that its effective components and derivatives have many pharmacological effects. *Glycyrrhiza uralensis* Fisch derivative 18  $\beta$ -glycyrrhizinic acid (18  $\beta$ -Gly) has a variety of pharmacological activities and shows good antitumor activity [5].

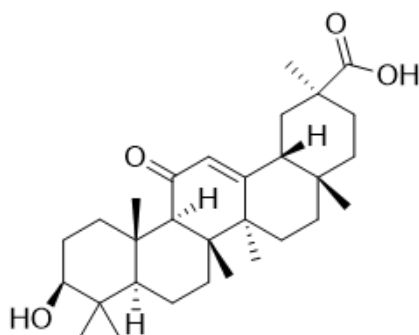
The following figures 3, 4, and 5 are the schematic diagrams of the chemical molecular structure of isolyglycyrrhizic acid, liquiritin, and 18 $\beta$ -glycyrrhetic acid, respectively:



**Figure 3.** The molecular structure of Isoliquiritigenin



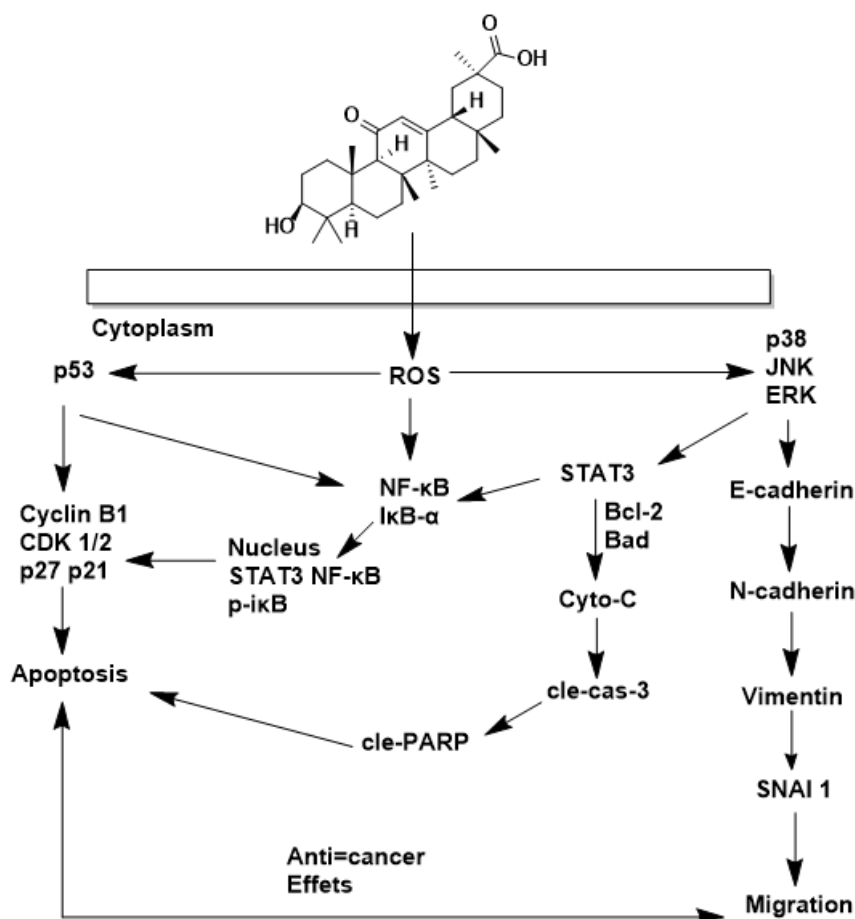
**Figure 4.** The molecular structure of liquiritin



**Figure 5.** The molecular structure of 18β-Gly

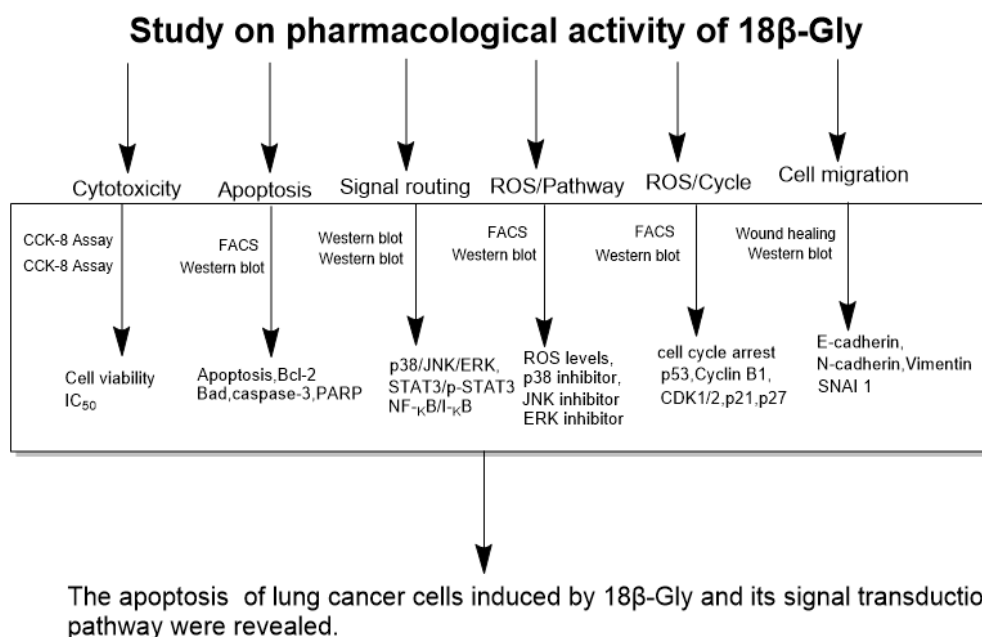
## 2. ANTI-LUNG CANCER EFFECT

18β-Gly, a glycyrrhiza derivative, has many pharmacological properties, such as anti-inflammatory, disease-free regulation, anti-infection, protective effects on liver tissue, and less toxic to body cells[6].Figure 6 is the specific anti-lung cancer mechanism of 18β-glycyrrhetic acid [7]:



**Figure 6.** The particular anti-cancer mechanism of 18β-Gly

Figure 7 reveals the apoptosis and signal transduction pathway induced by 18β-glycyrrhetic acid in lung cancer cells [8]:



**Figure 7.** Technological route

In terms of immune regulation, the immune system is progressively dysregulated by interacting with tumours. Glycyrrhiza uralensis Fisch can significantly enhance the differentiation, maturation and proliferation of many kinds of immune cells in innate immune system and adaptive immune system, and restore immune function. In terms of chemosensitization, tumor chemosensitization results from a variety of molecular mechanisms: Drug efflux rate increases, Drug metabolism changes and drug target mutations.

### 3. RESULTS

Figure 1-5 reveals the chemical and molecular structures of the effective components and derivatives of Astragalus and Glycyrrhiza, and Figure 6 illustrates the specific mechanism of action of 18β-glycyrrhetic acid against lung cancer and the induction of apoptosis and signal transduction pathways in lung cancer cells. It is concluded that Astragaloside IV mainly affects the proliferation, invasion, metastasis and apoptosis of lung cancer cells, affects the tumor immunity of lung cancer cells and enhances the sensitivity of chemotherapy drugs. Astragalus polysaccharide has the functions of anti-cancer, regulating immunity, anti-oxidation, anti-virus, anti-aging and so on. Glycyrrhetic acid, glycyrrhizic acid and glycyrrhizin in Glycyrrhiza uralensis Fisch have been found to have some anticancer activities. Glycyrrhiza derivative 18 β-Gly has a variety of pharmacological properties,

### 4. DISCUSSION

The current study found that Astragalus and its active ingredients have been proved to be able to play a combined anti-lung cancer synergism with a variety of chemotherapy drugs and targeted small molecule drugs. Anti-drug resistance or attenuation, has a good potential clinical transformation value, Astragalus as one of the representative of immunomodulatory anti-tumor Chinese medicine, whether by improving the inhibitory immune microenvironment to enhance anti-tumor immune synergism is worth further excavation; Increasing the sensitivity of chemotherapeutic agents is also one of the main anti-lung cancer mechanisms of astragaloside. Glycyrrhetic acid, glycyrrhizic acid and glycyrrhizin have been explored. Glycyrrhizic derivative 18β-Gly has a variety of pharmacological properties such as anti-inflammatory, immunomodulatory, anti-infection, liver protection and so on. At the same time, it is less toxic to somatic cells. 18β-Gly provides a new idea for the development of active substances

in glycyrrhiza, and further provides the possibility of 18 $\beta$ -Gly as a drug for the treatment of lung cancer.

## 5. CONCLUSION

Through in-depth collection and analysis of a large number of literature materials, this article systematically combed the effective components, pharmacological activities, anti-lung cancer mechanism and clinical significance of Radix Astragali and Radix Glycyrrhizae. In view of the key problem in science of the current clinical treatment of lung cancer drugs, combined with astragalus and glycyrrhiza anti-lung cancer effect and molecular mechanism. It provides a theoretical basis for exploring new precise combined treatment strategies, and provides new ideas for further exploration of new anti-lung cancer TCM.

However, there are still some disputes about the pharmacological effects of Astragalus membranaceus and Glycyrrhiza uralensis Fisch. The contribution of Astragalus and its active components, Glycyrrhiza uralensis Fisch and its derivatives to the anti-tumor efficacy remains to be further studied and clarified, and the problems of low clinical response rate and drug resistance need to be solved urgently.

## REFERENCES

- [1] Xu, W., Chen, G., Lo, Y., et al. (2019) New naphthalen products induced human lung cancer A549 cell proliferation via ros-mediated MAPKs, Akt, and STA3 signal routes. *Chemico-Biological Interaction*.
- [2] Zhang, Y., Mou, G., Li, T., et al. (2021) PD-1 Immune Checkpoint Inhibitor Therapy Malignant Tumor Based on Monotherapy and Combined Treatment Research. *Technology in Cancer Research & Treatment*, 20: 153303382110049.
- [3] Zhang, J., Li, M., Yuan, X., et al. (2020) Proceeds in the study of the anti-tumor mechanism of Pitantarone. *Chromatology of Traditional Chinese Medicine*, 33 (7): 76-80.
- [4] Wang, J., Xu, W., Pu, X., et al. (2018) Mechanism of human esophagus cancer HCE-4 cell apoptosis induced by cryptotanshinone. *Tumor Prevention*, 45 (8): 533-539.
- [5] Wang, H., Su, W., Wang, J., et al. (2018) CK2 molecular mechanism and potential therapy target in common cancer of the catenary. *Modern Animal Science and Technology*, 7: 8-10.
- [6] Li, S., Li, S., et al. (2023) Effect of Radix Stellariae IV on the Reverse of Resistance to DDP in Non-small Cell Lung Cancer A549 / DDP Cells. Thesis of Nanking Chinese Medical University.
- [7] Liu, R., Zhang, H., Wu, L., et al. (2000) Apoptotic effect of glycyrrhizin on human papillomavirus 18 positive HeLa cells. *J Cell Res Pharm*, 37 (22): 2727-2733.
- [8] Hasan, S.K., Siddiqi, A., Nafees, S., et al. (2016) Chemopreventive effect of 18 $\beta$ -glycyrrhetic acid via modulation of inflammatory markers and induction of apoptosis in human hepatoma cell line (HepG2). *Molecular and Cellular Biochemistry*, 416(1-2): 169-177.