

The impact of Fengcheng *Spatholobus spatholobi* on breast cancer

Sheng Gao

Abstract

The essay introduces the basic concept of breast cancer and its high incidence among Singaporean women. Scientists have tested different kinds of drugs to help manage or overcome the effects of breast cancer. In recent years, *Caulis spatholobi*, a Chinese herbal medicine, has attracted much attention. It has anti-tumor, antiviral, immune regulation, anti-inflammatory, antioxidant, soothing, and hypnotic effects. *Caulis Spatholobi* has also been found to positively affect the blood, including nourishing, improving blood circulation, and dredging the meridians. Clinically, it can be used to treat diseases such as irregular menstruation, blood deficiency, jaundice, numbness, rheumatism, and pain. *Caulis Spatholobi* can also reduce and improve blood pressure and positively regulate myocardial blood supply. *Caulis Spatholobi* is cylindrical. The outer surface is grayish brown, with a reddish-brown color and longitudinal grooves where the cork peels off. The transverse section of the medicinal herb shows a light redwood with an irregular arrangement of small pores. The skin has resin-like secretions that appear reddish brown or black brown. The most obvious feature of the medicinal herb is that it is arranged in an eccentric semi-circular ring with the wood alternately. Myelinated, small, and leaning to one side. The texture is solid and not easy to break, and the broken section may have irregular rows and flakes. Mild Qi, astringent taste. Promoting blood circulation, nourishing blood, and regulating menstruation: It can be used to treat menstrual disorders, dysmenorrhea, amenorrhea, and other symptoms, and is often combined with traditional Chinese medicine *Angelica*, *Chuanxiong*, and *Xiangfu*. Relaxing tendons and activating collaterals: This product is a commonly used medicine for treating meridian obstruction and disharmony. The elderly have weak qi and blood, numbness, and paralysis in their hands and feet. Radiation-induced leukopenia. This product has great results.

Keywords: Network pharmacology; Molecular docking; Fengcheng *Caulis Spatholobi*; Triple-negative breast cancer; Target; Mechanism

1. Introduction

Breast cancer refers to the abnormal growth of breast cells in the form of lumps. A tumor will develop when breast cells rapidly and uncontrollably grow and divide themselves faster than normal cells. Generally, it can be benign (non-cancerous) or malignant (cancerous). Cancerous cells are the most dangerous and can spread within the breast, to lymph nodes (glands) in the armpit, and other body parts. Breast cancer is the most commonly diagnosed form of cancer among Singaporean women. 1 in 13 women in Singapore will be diagnosed with breast cancer in their lifetime [1]. Scientists have experimented with different medicinal products that can be used to control or overcome the effects of breast cancer among women. A product that has received increased attention in the last few years is *Caulis Spatholobi*. It is the dried vine stem of *Spatholobus suberectus* Dunn (Leguminosae), known to have anti-tumor, antiviral, immunomodulatory, anti-inflammatory, antioxidant, soothing, and hypnotic efficacies [2]. *Caulis Spatholobi* in Fengcheng has been found to positively impact the blood, including nourishing blood, activating blood, and clearing collaterals. Clinically, it is used to treat clinical diseases such as

continuous menstruation (menorrhagia), blood deficiency and yellowing, numbness and paralysis, rheumatism, and arthralgia. This is primarily because it can increase the body's hemoglobin and red blood cell components. In addition, it can reduce and improve blood pressure since it has a positive regulatory effect on the myocardial blood supply.

1.1 Research Question

Can the application of Fengcheng *Spatholobus spatholobi* be effective in the treatment of triple-negative breast cancer corresponding to target gene therapy?

2. Hypothesis

The study proposes that the effective component of Fengcheng *Spatholobus* for treating triple-negative breast cancer (TNBC) can be isolated using molecular docking technology and in vitro experimental verification. Components are effective in the treatment of breast cancer.

2.1 Drug treatment steps

1. The important active ingredient of *Caulis spatholobi* in the treatment of TNBC disease was isolated.

2. Verify the integration with the Uniprot database and the core objectives of PDB.
3. Search for the PDBID of the target protein in the database while also searching for PubChem.
4. Download the three-dimensional structure of the corresponding components from the database.
5. Using automatic docking, the active ingredients of Fengcheng Chicken Blood Vine were screened in Tools 1.5.6.
6. Align the top 11 core goals of the Degree.
7. Finally, molecules can be used in the visualization tool Discovery Studio to visualize their docking results and then process and display them in the form of images.

The research group extracted it three times with 70% ethanol and trichloromethane. The results showed that some of its components were identified by LC-MS and nuclear magnetic resonance as anthocyanin, eight methylpredustine, xanthoquinone, and (2S) 1 O Heptatriacontanoylglycol, etc

3. Methodology

Based on literature research and combined with database screening, the main active components of Callerya nitidavar are as follows: Hirsutism and the related targets of TNBC were obtained. Intersection genes were found to construct a protein interaction (PPI) network diagram, and core targets were screened according to the correlation size. A core target interaction network model of "Traditional Chinese Medicine-Ingredients-Targets-Dis" was constructed. The intersection targets were analyzed for gene GO function and KEGG pathway enrichment analysis. Finally, molecular docking and invitro experimental verification of the selected components and the target were carried out. (3) Caulis spatholobi is extracted with n-butanol after water or ethanol extraction. The extract is washed with water using conventional macroporous resin and then eluted with a gradually increasing ethanol solution within the 10-95% ethanol concentration range. This includes elution with 60-90% ethanol and collection of 60-90% ethanol elution.

The water extract of Caulis spatholobi is preferably extracted with water at 60-120 °C 1-8 times; More preferably extracted 2-5 times. The ethanol extract of Caulis spatholobi is preferably extracted with 10-95% ethanol, more preferably with 20-80% ethanol, more preferably with 30-70% ethanol, and more preferably with 40-70% ethanol. The extraction method can choose to use percolation, reflux, immersion, or ultrasonic extraction,

Preferably extracted 1-8 times; More preferably extracted 2-5 times;

The Spatholobus suberect extract of the invention is preferably the water extract and ethanol extract of Spatholobus suberect obtained by successively extracting with Petroleum ether, ethyl acetate, and n-butanol or by selectively extracting one from the other.

The extracted extract is further optimized with macroporous resin. It is first eluted with water and then sequentially eluted with ethanol solution with gradually increasing concentration. A high concentration of ethanol-eluted substances is collected to form the active site of Caulis spatholobi.

The present invention provides a new extract of Caulis spatholobi containing glycyrrhizin, which is prepared by the following method: Caulis spatholobi is extracted with water or ethanol and then extracted with n-butanol. The extract is eluted with water using a conventional macroporous resin, followed by gradually increasing concentration of ethanol solution within the range of 10-95% ethanol concentration, including elution with 60-90% ethanol and collection of 60-90% ethanol elution; Preferably, the macroporous resin is weakly polar, further preferably D101 macroporous resin.

The water extraction of Caulis spatholobi is preferably carried out 1-8 times at a temperature of 60-120 °C; More preferably extracted 2-5 times. The ethanol extraction of Caulis spatholobi is preferably 10% -95% ethanol extraction, 20% -80% ethanol extraction, 30% -70% ethanol extraction, and 40% -70% ethanol extraction. The extraction method can use percolation, reflux, immersion, or ultrasonic extraction. Preferably extract 1-8 times; More preferably, extract 2-5 times.

The preferred method for preparing the active site of Caulis spatholobi in the present invention is to disperse and dissolve the water extract or alcohol extract of Caulis spatholobi in water and extract it with n-butanol. After the n-butanol extraction solution is depressurized and concentrated to dryness, the n-butanol extract is obtained. The n-butanol extract is adsorbed on a D101 macroporous adsorption resin column, washed with water until the eluent is colorless, and then eluted with 15-25%, 35-45%, and 60-90% ethanol solutions. 80% ethanol elute is collected and concentrated to dryness under reduced pressure. More preferably, it includes 80% ethanol elution and collection of 80% ethanol-eluted substances(see Table 1).

Table 1. Possible results

	The increased killing of cells by MTT	Decreased tumor size nografts	Increased apoptosis of cells by FACS	Support Hypothesis?
Result 1	+	+	+	Yes
Result 2	+	+	-	Partially
Result 3	+	-	+	Partially
Result 4	-	+	+	Partially
Result 5	+	-	-	Partially
Result 6	-	-	+	Partially
Result 7	+	-	+	Partially
Result 8	-	-	-	No

4. Discussion

Result 1

- ◆ Increased killing of cells by MTT
- ◆ Decreased tumor size of nografts
- ◆ Increased apoptosis of cells by FACS
- ◆ Conclusion: Result 1 supports the Hypothesis

Result 2

- ◆ Increased killing of cells by MTT
- ◆ Decreased tumor size of nografts
- ◆ Decreased apoptosis of cells by FACS
- ◆ Conclusion: Result 2 supports the hypothesis partially

Result 3

- ◆ Increased killing of cells by MTT
- ◆ Increased tumor size of nografts
- ◆ Increased apoptosis of cells by FACS
- ◆ Conclusion: Result 3 supports the hypothesis partially

Result 4

- ◆ Decreased killing of cells by MTT
- ◆ Decreased tumor size of nografts
- ◆ Increased apoptosis of cells by FACS
- ◆ Conclusion: Result 4 supports the hypothesis partially

Result 5

- ◆ Decreased killing of cells by MTT
- ◆ Increased tumor size of nografts
- ◆ Increased apoptosis of cells by FACS
- ◆ Conclusion: Result 5 supports the hypothesis partially

Result 6

- ◆ Increased killing of cells by MTT
- ◆ Increased tumor size of nografts
- ◆ Decreased apoptosis of cells by FACS
- ◆ Conclusion: Result 6 supports the hypothesis partially

Result 7

- ◆ Decreased killing of cells by MTT
- ◆ Decreased tumor size nografts
- ◆ Decreased apoptosis of cells by FACS
- ◆ Conclusion: Result 7 supports the hypothesis partially

Result 8

- ◆ Decreased killing of cells by MTT
- ◆ Increased tumor size of nografts
- ◆ Decreased apoptosis of cells by FACS
- ◆ Conclusion: Result 8 does not support the hypothesis

5. Conclusion

The analysis of findings demonstrates that Fengcheng Caulis Spatholobi can potentially treat TNBC. The active ingredients should be emphasized, including luteolin and botulinic acid. The research found that luteolin can inhibit NF κ B /c-Myc activation. It also inhibits hTERT transcription to further inhibit telomerase activity. Proliferation, migration, cell cycle progression and induction of apoptosis in breast cancer. It must be increased killing of cells by MFT, decreased tumor size of no grafts, and increased apoptosis of cells by FACS.

References

- [1] Mount Elizabeth. (n.d.). Breast Cancer. What is breast cancer? https://www.mountelizabeth.com.sg/conditions-diseases/breast-cancer/symptoms-causes?gclid=EAIaIQobChMI-emegJDA_QIVp51LBR2nxQAIeAAAYASAAEgKdffD_BwE
- [2] Liu, B., Liu, J., Chen, J., Zhu, D., Zhou, H., & Wang, X. (2013). Study on anticancer activity of caulis spatholobi extract on human osteosarcoma saos-2 cells. African Journal of Traditional, Complementary and Alternative Medicines, 10(5), 256-260. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3847413/>