

# Briefly Describe the Traditional Preparation Method of Mercury in Mongolian Medicine

Qimuge<sup>1,3,4</sup>, Terbish L<sup>2</sup>, Bold Sharavyn<sup>3,\*</sup>

Qimuge<sup>1,3,4</sup>, Terbish L<sup>2</sup>, Bold Sharavyn<sup>3,\*</sup>

<sup>1</sup>Mongolian Medical College, Inner Mongolian Minzu University, CHINA.

<sup>2</sup>Mongolian National Academy of Sciences, Mongolian.

<sup>3</sup>International School of Mongolian Medicine, Mongolian National University of Medical Sciences, Mongolian.

<sup>4</sup>Key Laboratory of Mongolian Medicine Research and Development Engineering, Ministry of Education, Tongliao 028000

## Correspondence

Bold Sharavyn

International School of Mongolian Medicine, Mongolian National University of Medical Sciences, Mongolian.

E-mail: boldshrv@gmail.com

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## ABSTRACT

**Objective:** This study aims to review the traditional preparation methods and clinical applications of mercury in Mongolian medicine through a literature review. **Methods:** Ancient and modern literature on the preparation of mercury were reviewed, and the recorded preparation methods in the literature were summarized and organized. The clinical applications were also briefly described. **Results:** The traditional preparation methods of mercury in Mongolian medicine can be divided into two parts: preparation before processing and specific processing methods. The preparation before processing includes steps such as removing impurities and reducing the weight of mercury. The "Four Parts Ganlu" emphasizes the toxicity of mercury due to its rust (impurities) and weight. Specific processing methods include hot processing, cold processing, slow processing, and quick processing. According to the clinical application records in the literature, hot processing is widely used and still in use today. As a commonly used mineral medicine in Mongolian medicine, mercury is found in various compound formulations recorded in the literature, with a focus on diseases such as "bile", lymphatic, and brain diseases. The proportion of mercury used varies significantly. For example, the preparation of mercury in the Mongen Wusu-18 pill has a higher content and is widely used with significant effects. In addition, mercury is also used in formulations such as Qishiwu Pearl Pill, Ershiwu Songshi Pill, and Ershiwu Coral Pill. **Conclusion:** The review and study of the traditional preparation methods of mercury in Mongolian medicine can contribute to the standardization and normalization of processing techniques and provide reference materials for the safe application and formulation of mercury processing products.

**Key words:** Mercury, Traditional processing methods, Literature research.

## INTRODUCTION

Meng Gen Wu Su (mercury) is a mineral medicine and a valuable medicinal herb commonly used in Mongolian medicine. Among the more than 2,000 recorded formulas in the "Mongolian Medical Golden Treasury," 122 of them contain Meng Gen Wu Su, accounting for 6.1%.<sup>1</sup> In the "Tongwa Gadzhi De," which records over 300 formulas, 15 of them include Meng Gen Wu Su, accounting for 5%.<sup>2</sup> This indicates the widespread use of Meng Gen Wu Su in the clinical practice of Mongolian medicine. Mercury is a liquid metal that occurs naturally or is extracted from mercury-containing minerals. It possesses the effects of drying and dispersing, promoting pus and blood circulation, killing parasites, and resolving abscesses.<sup>3</sup> After preparation, the toxicity of mercury decreases and it becomes non-flowing, making it suitable for clinical application and easy absorption.

The preparation of Meng Gen Wu Su involves two steps: pre-preparation and specific preparation methods. Meng Gen Wu Su is widely used in Mongolian medicine, and commonly used formulas include Meng Gen Wu Su-18, Meng Gen Wu Su-14, Sa Ren Ga Ri Di, Jiang Jun Shi Ba Wei Wan, Qi Shi Wei Zhen Zhu Wan, Er Shi Wu Wei Song Shi Wan, Er Shi Wu Wei Shan Hu Wan, etc. This paper aims to summarize and organize the relevant information about the preparation of Meng Gen Wu Su found in the literature and provide an overview of its clinical applications.

## Preparation before processing

Meng Gen Wu Su, commonly known as "mercury," is a toxic silver-white metal. It is the only liquid metal at room temperature and can evaporate due to its volatility. Its vapor can quickly distribute throughout the body by passing through the lipid-containing cell membranes of the alveoli and combining with lipids in the blood. Mercury is oxidized to Hg<sup>2+</sup> in red blood cells and other tissues, and it binds to proteins to accumulate, making it difficult to release. Inhalation of small amounts can cause neurological abnormalities, gingivitis, and tremors as the main symptoms. Acute mercury poisoning occurs with high-level inhalation of mercury vapor or ingestion of mercury compounds. Therefore, appropriate preparation is necessary to reduce its toxicity. The preparation of mercury must first remove impurities and reduce their heaviness. The "Si Bu Gan Lu" records that "the toxicity of Meng Gen Wu Su lies in its rust (impurities) and heaviness".<sup>4</sup>

## Deimpurification method of Meng Gen Wu Su:

In the "Si Bu Gan Lu",<sup>4</sup> it is recorded that "take one Liang of Meng Gen Wu Su, mix it with one teaspoon of three xin (dried ginger, bi ba, and black pepper powder), add a small amount of water, put it in a bag made of deer skin, knead and rub for half a day, then add salt and alkali, knead and rub in a bowl for half a day. Meng Gen Wu Su is then mixed with boy's urine, black alum solution, borax solution, cinnabar solution, realgar solution, manganese nitrate solution, magnesium solution, alkali solution, liquid iodine salt, as well as alcohol, sea buckthorn

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water, alum solution, and 15 other liquid substances. Knead and rub in order for a total of seven and a half days, then transfer it to a new pottery vessel, and wash it repeatedly. Meng Gen Wu Su will become pure white." Meng Gen Wu Su and three xin, alkali flowers, salt, and other powders are packed in a bag made of goat or stone goat skin and kneaded for a long time, maintaining a temperature of 25-40°C. This method can remove other oxidized compounds or induce certain chemical reactions that may be present, resulting in the powder turning blue-black.<sup>5</sup>

**Method to reduce the Heaviness of Meng Gen Wu Su:** Meng Gen Wu Su is mixed with auxiliary materials such as cold-water stone, alcohol, sea buckthorn, alum solution, sheep fat, and bone marrow. It is repeatedly boiled until it reaches a thick paste-like consistency. The paste is considered the desired standard when a wooden stick can stand upright in it. The mixture is then ground into a gray-brown powder.

### Specific processing methods

Different processing methods can be applied to Meng Gen Wu Su based on clinical needs.

**Heat processing method:** According to the "Tong Wa Ga Ji De",<sup>2</sup> sulfur powder (2 Liang) is mixed with Meng Gen Wu Su (1 Liang) and heated in an iron pot. When a blue flame appears, it is stirred with an iron tool. It is repeatedly heated until it turns sky blue, then removed from the heat and allowed to solidify in an oil container. The "Mongolian Medicine Prescription"<sup>6</sup> states, "Take an equal amount of Meng Gen Wu Su and sulfur, put them in an iron pot, heat them, and after melting 21 times, let it cool and solidify. If the cross-section is yellow, it means the processing is insufficient; if it is sky blue, it is considered well-processed. Pay attention to avoid excessive heat during the heating process, which may cause Meng Gen Wu Su to burn and reduce its efficacy." The "Chinese Materia Medica: Mongolian Medicine Volume"<sup>3</sup> records, "Take an equal amount of Meng Gen Wu Su and sulfur powder, put them in a pre-greased iron pot with butter or sheep fat, heat it while continuously stirring with an iron tool, paying attention to the heat. When it thickens, immediately remove the pot and continue stirring. Once it becomes thinner, put it back on the heat. Repeat this process several times, let it cool and solidify, and the cross-section should be gray-black (without Meng Gen Wu Su particles) as the standard." The "Si Bu Gan Lu"<sup>4</sup> states, "Cook Meng Gen Wu Su with alcohol, sea buckthorn decoction, red salt, alkali, fat, bone marrow, and sesame seeds once, discard the liquid, and then cook it seven times with an equal amount of alcohol." In addition, the "He Li Le Jing Zhu Jie Yi Nan Jing"<sup>7</sup> states, "Mix cold water stone, female yellow, male yellow, magnetite, silver stone, lithium mica, black alum, and square stone, and mix them with water. Continuously knead and rub with Meng Gen Wu Su until dry, until it can stand a needle upright."

**Cold processing method:** According to the "Chinese Materia Medica: Mongolian Medicine Volume",<sup>3</sup> an equal amount of Meng Gen Wu Su and sulfur powder are placed in a mortar and ground until they turn gray-black, with no visible particles of Meng Gen Wu Su. The "Si Bu Gan Lu"<sup>4</sup> states that a large amount of water is added to Meng Gen Wu Su and sulfur, continuously ground until the water dries out, and then water is added again for further grinding. This process is considered ideal. According to the "Processing Ming Cang" record, after the sulfur powder (2 qian) and Meng Gen Wu Su (1 qian) are well processed, they are ground in a ceramic jar.<sup>8</sup> In summary, the cold processing method of Meng Gen Wu Su can be outlined as grinding an equal amount of Meng Gen Wu Su and sulfur in water until they become powder.

**Slow processing method:** The "Tong Wa Ga Ji De"<sup>2</sup> states: "Take 1 qian of Meng Gen Wu Su, 6 fen of tin, and 4 fen of lead, and heat them with a drop of oil in an iron spoon. Then, put them into sea buckthorn soup, let it cool, and knead and wash it in cold water. Repeat this

process twice. This processed product can be used in the preparation of complex formulations to resolve the toxicity of Meng Gen Wu Su."

**Intense processing method:** According to the "Tong Wa Ga Ji De",<sup>2</sup> half qian of Meng Gen Wu Su, 2 bags of distillers' grains, and 5 qian of salt are placed in a leather bag, sealed tightly, and continuously kneaded for a day. After removing the washed water, this process is repeated for 7 days before boiling in an oil pot. The "Si Bu Gan Lu"<sup>4</sup> states that Meng Gen Wu Su is boiled together with wine, chili liquid, red salt, alkali, fat, bone marrow, and sesame in a ceramic pot, and kneaded for half a day. The "Processing Ming Cang"<sup>8</sup> records that 2 qian of Meng Gen Wu Su is mixed with 1 drop of sour wine, 1 spoonful of salt, 1 spoonful of alkali, and a small amount of chili, bone marrow, and fat is added, placed in a ceramic or stone jar, heated over low heat, and stirred occasionally. When fully cooked, the Meng Gen Wu Su is removed and transferred to a prepared jar. After repeating this process 3 times, 1 drop of oil is added, and it is simmered over low heat.

### Clinical application

Meng Gen Wu Su is commonly used in the clinical practice of Mongolian medicine. The proportion of Meng Gen Wu Su varies greatly in different Mongolian medicine formulations. Among them, Meng Gen Wu Su-18 Wei Wan, also known as "Mercury-18 Wei Wan" or "Wu Li Chu-18", has a high content of processed Meng Gen Wu Su and is widely used in clinical practice with remarkable therapeutic effects. An analysis of the treatment of various diseases with Meng Gen Wu Su-18 Wei Wan reveals that the pathogenesis is mostly caused by imbalances of the three roots in the body due to various reasons. Mongolian medicine considers this as an imbalance of the internal Xie Ri Wu Su, functional disorders, and accumulation in certain parts of the body leading to the onset of diseases.<sup>9,10</sup> Saren Gari Di mainly uses Meng Gen Wu Su, which has the properties of drying dampness and killing parasites, for the treatment of rheumatoid arthritis.<sup>11</sup> In various compound formulations containing Meng Gen Wu Su mentioned in the literature, the indications are mostly related to "Xie Ri Wu Su" disease, "He La" disease, and neurological disorders.<sup>12-15</sup> Meng Gen Wu Su is a basic ingredient in the Seventy-Ingredient Pearl Pill, a famous Tibetan medicine formula commonly used to treat "black and white pulse disease," imbalance of Qi and blood, stroke, Alzheimer's disease, and others.<sup>16-18</sup> Meng Gen Wu Su is also found in other formulations such as the Twenty-Five-Ingredient Song Shi Pill<sup>19</sup> and the Twenty-Five-Ingredient Shan Hu Pill.<sup>20</sup>

### CONCLUSION

Based on the relevant literature, the traditional processing of Meng Gen Wu Su can be divided into pre-processing preparation and specific processing methods. The specific processing methods vary depending on different clinical needs and indications. It is necessary to use modern scientific and technological methods to determine the toxicity and therapeutic effects of differently processed Meng Gen Wu Su products. The following points should be noted: it is necessary to conduct comparative experiments on the toxicity of Meng Gen Wu Su and mercuric sulfide. The metabolism and excretion of processed Meng Gen Wu Su products in the body should be tested to further verify the presence of chronic cumulative toxicity. Different methods should be explored to understand their different effects on Meng Gen Wu Su and their impact on pharmacological actions. Medicinal materials with similar effects as processed Meng Gen Wu Su but with less toxicity should be screened and used as alternatives to processed Meng Gen Wu Su.

### PROJECT NAME

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