

## GYPSUM FORMULA FAMILY

石膏類方 *shí gāo lèi fāng*

**G**YPSUM FIBROSUM (*shí gāo*) is a sedimentary mineral, with a monoclinic crystal system, and is comprised of calcium sulfate. White in color, heavy in nature, when broken it is possible to see its transparent crystal-line structure that in longitudinal view has a fine, glossy, grain-like, densely packed structure. Gypsum fibrosum (*shí gāo*) is primarily produced in the Chinese provinces of Hubei, Anhui, Henan, Shandong, Sichuan, and Gansu, with Hubei's Yingcheng City and Anwei's Fengyang City being the most famous producers of this medicinal.

Gypsum fibrosum (*shí gāo*) is a medicinal traditionally used to clear heat. *Divine Husbandman's Classic of the Materia Medica* (神農本草經 *Shén Nóng běn cǎo jīng*) states: "[It] primarily treats wind-attack with chills and fever, counterflow qi in the epigastrium, fright asthma, a dry mouth, and burnt tongue." *Miscellaneous Records of Famous Physicians* (名醫別錄 *Míng yī bié lù*) says: "[It] eliminates seasonal disease with headache and fever, intense heat in all the three burners, the skin is hot, blocked up heat in the Stomach and Intestines ... stops thirst, irritability and counterflow." For thousands of years, Chinese doctors have used Gypsum fibrosum (*shí gāo*) and its associated family of formulas to reduce fevers and eliminate irritability. Much like Rhei Radix et Rhizoma (*dà huáng*), Gypsum fibrosum (*shí gāo*) can be lifesaving to those at a critical juncture of a serious illness. Its therapeutic efficacy is thus well praised. Numerous references to the use of Gypsum fibrosum (*shí gāo*) are found within the essays and informal writing of many poets and scholars. For instance, the Qing-dynasty poet Yuan Mei details in his famous *Poems and Talks from Sui's Garden* (隨園詩話 *Suí yuán shī huà*) how he nearly died from summerheat malaria, but thanks to Gypsum fibrosum (*shí gāo*), he was cured. Ji Xiao-Lan (紀曉嵐), another Qing-dynasty literary giant, in the *Fantastic Tales* (閱微草堂筆記 *Yuè wēi cǎo táng bǐ jì*) recorded stories from many survivors of the

1793 epidemic in the nation's capital of a doctor from Tongcheng in Anhui who saved many lives using prescriptions containing large doses of Gypsum fibrosum (*shí gāo*). The modern medical community also has its share of experts that excel at using Gypsum fibrosum (*shí gāo*) to treat disease. The famous modern doctor Zhang Xi-Chun (張錫純) liked to use untreated Gypsum fibrosum (*shí gāo*) along with aspirin to reduce fevers in a formula called Aspirin and Gypsum Decoction (阿斯匹靈石膏湯 *ā sī pī líng shí gāo tāng*). One of Beijing's four most famous doctors in the mid-twentieth century, Kong Bo-Hua (孔伯華), because of his expertise in using Gypsum fibrosum (*shí gāo*), was nicknamed Gypsum Kong (孔石膏).

### Gypsum Presentation (石膏證 *shí gāo zhèng*)

The heat presentations treated by Gypsum fibrosum (*shí gāo*) are not what in common parlance is referred to as fever, but rather it is a kind of illness presentation where the main symptoms are thirst, dry mouth, a hot body with profuse sweating, and a flooding and forceful pulse. Chinese doctors call this a dry and hot presentation (燥熱證 *zào rè zhèng*) or qi-level heat (氣熱證 *qì rè zhèng*); in this book, it is referred to as a gypsum presentation (石膏證 *shí gāo zhèng*). Dryness (燥 *zào*) is indicative of the patient manifesting symptoms of thirst and a dry tongue. The physiological reaction to this condition is similar to the reaction one might have to an intense summer heat wave, which is to say there is profuse sweating, thirst, irritability and restlessness, and a mild headache. This type of dry heat presentation is frequently seen in acute febrile illnesses, but also can be seen in chronic and allergic types of illnesses as well. Its distinguishing symptoms are:

- .....
1. Irritability and thirst with a desire to drink
  2. Aversion to heat and profuse sweating
  3. A very dry tongue
  4. Large and flooding pulse, or one that is floating and slippery
- .....

Irritability and thirst with a desire to drink is indicative of the patient not only being intensely thirsty, but also being able to drink a large volume of fluids. Chinese doctors of the past used the two words 'big thirst' (大渴 *dà kě*) as a way of describing this condition. Aversion to heat simply means that the patients have a strong aversion to heat and are drawn toward cold environments and beverages. Heat makes them feel irritable, restless, and uneasy; additionally, they tend to sweat profusely. The profuse sweating cools the skin, which otherwise



would be hot to the touch. There may be a tongue coating, but the tongue itself will surely be very dry. If the tongue coating is moist, slippery, or greasy, it is not a gypsum presentation. The large and flooding, or floating and slippery, pulse reflects the acceleration in the body's metabolic processes. Patients whose entire body feels hot and who sweat profusely frequently have this type of pulse. The above four symptoms are usually seen together, and their intensity is directly proportional to the severity of the illness.

The gypsum and rhubarb presentations are different. The latter is marked by constipation, abdominal pain and fullness with a tender abdomen, along with a red tongue and a thick, burnt yellow or greasy coating. These indicate the presence of foul, dried-out stool within the digestive tract, which is considered to be a presentation of excess heat with form. Constipation, abdominal pain, and assorted digestive system symptoms are not so prominent in the gypsum presentation; the characteristic signs here are intense thirst, fever, profuse sweating, and a large, flooding pulse. These express within the body due to an unformed, pervasive, scorching dry heat and therefore are considered to be a dry heat or qi-level heat presentation.

The gypsum and cinnamon presentations should also be differentiated as there are obvious differences between them even though there are some apparent similarities, namely, spontaneous sweating, a subjective sense of feverishness, and a large, floating pulse. Spontaneous sweating is accompanied in the cinnamon twig presentation by aversion to wind, while in the gypsum presentation there is aversion to heat with profuse sweating. The cinnamon twig presentation is without thirst, whereas the gypsum presentation has irritability along with extreme thirst. While the pulse is large in both presentations, it is also lax in

the cinnamon twig presentation, while it is flooding and slippery in the gypsum presentation. What is more, the cinnamon twig presentation is commonly seen in chronic illness, while the gypsum presentation is more common in acute febrile illnesses.

The gypsum presentation can manifest within the course of many different diseases, therefore Gypsum fibrosum (*shí gāo*) is commonly paired with other medicinals. Gypsum fibrosum (*shí gāo*) used together with Anemarrhenae Rhizoma (*zhī mǔ*), as in the formula White Tiger Decoction (*bái hǔ tāng*), treats the high fever, irritability, thirst, and profuse sweating of acute febrile diseases. Gypsum fibrosum (*shí gāo*) paired with Ephedrae Herba (*má huáng*), as in the ephedra family formulas Ephedra, Apricot Kernel, Gypsum, and Licorice Decoction (*má xìng shí gān tāng*) and Maidservant from Yue's Decoction plus Atractylodes (*Yuè bì jiā zhú tāng*), treats feverishness and sweating when there is coughing and wheezing, or edema. Gypsum fibrosum (*shí gāo*) combined with Ginseng Radix (*rén shēn*), Anemarrhenae Rhizoma (*zhī mǔ*), and Astragali Radix (*huáng qí*) treats thirst from diabetes. When used with Cinnamomi Ramulus (*guì zhī*), as in the formula White Tiger plus Cinnamon Twig Decoction (*bái hǔ jiā guì zhī tāng*), it treats fever with aversion to wind or joint pain. Gypsum fibrosum (*shí gāo*) together with Rhei Radix et Rhizoma (*dà huáng*), as exemplified in the formula Saposhnikovia Powder that Sagely Unblocks (*fáng fēng tōng shèng sǎn*), treats fever, constipation, irritability, and restlessness. Some of these prescriptions have already been discussed in their respective chapters; this chapter primarily explores White Tiger Decoction (*bái hǔ tāng*) as the representative formula of the Gypsum fibrosum (*shí gāo*) formula family.

The main constituent of Gypsum fibrosum (*shí gāo*) is  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ , which only has a weak antipyretic function. However, by combining Gypsum fibrosum (*shí gāo*) with other medicinals, they synergistically manifest a relatively strong ability to clear heat.

There is a report of a decocted solution of Gypsum fibrosum (*shí gāo*) being able to reduce an animal model of excess-type fevers in rabbits. It was able to bring the fever down quickly but not able to sustain this function. The calcium ions in Gypsum fibrosum (*shí gāo*) can maintain macrophage function. As a result, Gypsum fibrosum (*shí gāo*) strengthens the immune response. Calcium also functions to reduce blood vessel permeability and acts both as an antipyretic and anti-allergen. Still, this modern pharmacological research does not seem to explain the clinical efficacy of this substance. I therefore believe that for clinical use, it is still best to follow the practices and experience of doctors who have preceded us.

## 6.1 White Tiger Decoction (白虎湯 *bái hǔ tāng*)

SOURCE: *Discussion of Cold Damage* (傷寒論 *Shāng hán lùn*)

Gypsum fibrosum ( <i>shí gāo</i> ) .....	12-30g
Anemarrhenae Rhizoma ( <i>zhī mù</i> ) .....	6-15g
Glycyrrhizae Radix ( <i>gān cǎo</i> ) .....	3-6g
Nonglutinous rice ( <i>jīng mǐ</i> ) .....	10g

In speaking of White Tiger Decoction (*bái hǔ tāng*), the story of its use in the treatment of epidemic encephalitis B must be told. Encephalitis B is an extremely dangerous acute infectious disease, which Western medicine also finds to be quite difficult to treat. In 1954, there was a report that drew a lot of attention; some Chinese doctors in Shijiazhuang, Hebei had used, with excellent therapeutic effect, a large dose of White Tiger Decoction (*bái hǔ tāng*) as the primary treatment of epidemic encephalitis B. Not only did this become the standard method of treatment for encephalitis B in many other places, but at the same time, it caused many of those who had doubts about Chinese medicine's methods to change their views about it. Based on domestically published statistical data, Guo compiled a report on 470 cases of epidemic encephalitis B and found that all used White Tiger Decoction (*bái hǔ tāng*) as the primary method of treatment, sometimes in combination with common biomedical emergency or supportive treatments, and that the cure rate was in the range of 80 to 100 percent, with a mortality rate that was dramatically less than normal for this disease.<sup>1</sup> Pharmacological research has shown that White Tiger Decoction (*bái hǔ tāng*) has significant antipyretic effect against endotoxin-induced fevers in rabbits. It also strikingly lowers the mortality rate of laboratory mice infected with the virus that causes encephalitis B.<sup>2</sup>

In fact, before this incident there was already a very long history of using White Tiger Decoction (*bái hǔ tāng*) to treat febrile disease. It is an important formula found in *Discussion of Cold Damage* to treat febrile diseases at their most extreme phase. Most of the prescriptions used by the Ming-dynasty physician Miao Xi-Yong, renowned for his ability in treating febrile epidemic disease, were variations of White Tiger Decoction (*bái hǔ tāng*), Lophatherum and Gypsum Decoction (*zhú yè shí gāo tāng*), and Ophiopogonis Decoction (*mài mén dòng tāng*), with the amount of Gypsum fibrosum (*shí gāo*) used frequently in the area of 30g, with a large single dosage of up to 100g. In an extreme case, a patient could take 50g in a 24-hour period. The dosage of Gypsum fibrosum (*shí gāo*) used by the famous Qing-dynasty doctor Yu Lin are an even

bigger surprise. He was an expert in treating febrile epidemic diseases. In his formula Clear Epidemics and Overcome Toxicity Drink (*qīng wēn bài dú yīn*), a modification of White Tiger Decoction (*bái hǔ tāng*), a large dosage of Gypsum fibrosum (*shí gāo*) was 180-240g and a smaller dosage was 24-36g. Observers at that time were convinced of its efficacy. The modern disease of encephalitis B belongs to the traditional category of warm pathogen epidemics (溫疫 *wēn yì*); as the dry and hot gypsum presentation commonly manifests during this disease, White Tiger Decoction (*bái hǔ tāng*) can be considered a formula with a positive traditional track record in the treatment of this disease.

Other than Gypsum fibrosum (*shí gāo*) in White Tiger Decoction (*bái hǔ tāng*), there is also the heat-clearing herb Anemarrhenae Rhizoma (*zhī mǔ*), which Chinese doctors use to treat symptoms of irritability and restlessness, a hot body, thirst, constipation, and hacking cough. Zhang Zhong-Jing commonly used the combination of Gypsum fibrosum (*shí gāo*) and Anemarrhenae Rhizoma (*zhī mǔ*) to treat (from paragraph 219) “abdominal fullness, a heavy body that is hard to rotate or bend, a lack of sensation in the mouth, a dirty face, incoherent speech, enuresis, ... and spontaneous sweating,” or to treat (paragraph 350) “cold damage with a slippery but faint pulse,” or to treat (paragraph 176) “cold damage with a floating and slippery pulse.” These presentations are just another way to describe high fever, stupor, and convulsions. It can be seen that the heat in the White Tiger Decoction presentation, with its primary herbs Gypsum fibrosum (*shí gāo*) and Anemarrhenae Rhizoma (*zhī mǔ*), is more severe than that of the gypsum presentation alone. The White Tiger Decoction presentation can be seen in the following three situations:

- .....
1. Gypsum presentation accompanied by a high fever
  2. Gypsum presentation accompanied by irritability, restlessness, and muddled consciousness
  3. Gypsum presentation accompanied by severe thirst
- .....

- A White Tiger Decoction presentation is very commonly seen in patients during the acute phase of viral infections that present with a high fever. In addition to epidemic encephalitis B, there are reports of this formula being used to treat infectious hemorrhagic fevers. In one report, the formula was used to treat 130 subjects, with excellent results. The associated fevers dropped significantly and there was clear improvement in the symptoms from systemic toxicity (especially those related to consciousness). Of the patients with temperatures of 40°C (104°F) and above, 91.5 percent showed

temperatures returning to normal within two days. However, not all cases within this group showed improvement: 10 experienced renal failure and shock, and there was one fatality.<sup>3</sup>

There are numerous reports that detail the use of modifying White Tiger Decoction (*bái hǔ tāng*) with heat-clearing, toxicity-resolving, and yin-nourishing medicinals such as Lonicerae Flos (*jīn yín huā*), Forsythiae Fructus (*lián qiào*), Salviae miltiorrhizae Radix (*dān shēn*), Rhei Radix et Rhizoma (*dà huáng*), and Imperatae Rhizoma (*bái máo gēn*) to treat fevers at the qi level of disease. This formula's presentation is often seen in cases of influenza with a high fever, rheumatic fever, as well as high fevers of unknown origin. There is a report of using this formula with the addition of Isatidis/Baphicacanthis Radix (*bǎn lán gēn*) and Peucedani Radix (*qián hú*) to treat 50 patients with high fever from the flu, all of whom had their fevers recede within two days. It is important to note that in the experience of the authors of this report, if the high fever is accompanied by a lack of sweating, chills, and a mouth that is not dry or there is no thirst, then White Tiger Decoction (*bái hǔ tāng*) is not the formula to use.<sup>4</sup>

White Tiger Decoction (*bái hǔ tāng*) with the addition of Atractylodis Rhizoma (*cāng zhú*) is used to treat high fevers with an accompanying feeling of heaviness and fatigue and a greasy tongue coating; this formula is called White Tiger plus Atractylodes Decoction (*bái hǔ jiā cāng zhú tāng*). There is a report of using this formula with chloramphenicol to treat fevers from typhoid and paratyphoid in 173 patients, and it was found to reliably alleviate high fevers of 40°C (104°F) and control other symptoms.<sup>5</sup> For a persistently high fever with a sparsely coated red tongue and constipation, combining it with Increase the Fluids Decoction (*zēng yè tāng*)\* strengthens the therapeutic effect. Xia treated a patient with acute transverse myelitis who had a high fever that persisted for 66 days. The biomedical doctors who had been treating him had been unsuccessful. His body temperature was successfully lowered after taking five packets of a modification of this formula.<sup>6</sup>

- In clinical practice, even in the absence of a high fever, the White Tiger Decoction presentation is frequently seen in cases of ophthalmologic disease, nosebleeds, summertime dermatitis, recalcitrant allergic dermatitis, acute stomatitis, or periodontitis where there are signs of aversion to heat with sweating, or irritability and restlessness with thirst. There is a report of using White Tiger Decoction (*bái hǔ tāng*) with the addition of Scutellariae Radix

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\* Rehmanniae Radix (*shēng dì huáng*), Ophiopogonis Radix (*mài mén dòng*), and Glehniae Radix (*bèi shā shēn*).

(*huáng qín*), Forsythiae Fructus (*lián qiào*), and Lonicerae Flos (*jīn yín huā*) to treat four patients with sympathetic ophthalmia and seven who suffered from inflammation of the optic disk, all of whom had a significant increase in their visual acuity. A follow-up interview after four years confirmed the stability of the treatment.<sup>7</sup> Yao, a veteran Chinese doctor, had a lot of experience using White Tiger Decoction (*bái hǔ tāng*) to treat eye diseases. He set out four main points based on his experiences that indicate when this formula is appropriate:

1. The eyes are severely swollen and red, and symptoms of irritation are relatively severe.
2. The tongue is red and lacking moisture, or red with a dry, yellow coating.
3. The pulse is slippery and rapid, flooding and rapid, or large, flooding, and forceful.
4. The physique is robust, with a ruddy complexion, the nose is dry with a burning sensation, the lips and mouth are dry, and there is irritability and thirst with a desire to drink cold beverages.

Various types of eye diseases can be treated with this formula if they present with the above signs and symptoms.<sup>8</sup>

White Tiger Decoction (*bái hǔ tāng*) combined with Guide Out the Red Powder (*dǎo chì sǎn*)\* was used to treat 100 children with blistering stomatitis. Within three days, 13 were symptom free, and 80 of the children had their symptoms disappear within seven days; the average time to cure was 4.8 days.<sup>9</sup> There is also a reported use of this formula with the addition of Glehniae/Adenophorae Radix (*shā shēn*), Lophatheri Herba (*dàn zhú yè*), Cicadae Periostracum (*chán tui*), Sophorae flavescens Radix (*kú shēn*), and Rehmanniae Radix (*shēng dì huáng*) to treat 40 subjects with summertime dermatitis, resulting in 24 being cured and 16 improving. It also cured drug rashes in another 13 children.<sup>10</sup>

The types of illnesses treated by White Tiger Decoction (*bái hǔ tāng*) are not limited to those discussed above. It can be used also for various types of conditions involving inflammation, infection, digestive illness, allergic disease, heat stroke, feverishness, headache and tooth pain, manic episodes, unusually strong appetite, and abnormal sweating when these are accompanied by a White Tiger Decoction presentation. However, to use this formula effectively, it is vitally important to have a good command of the White Tiger Decoction

\* Rehmanniae Radix (*shēng dì huáng*), Lophatheri Herba (*dàn zhú yè*), Akebiae Caulis (*mù tóng*), and Glycyrrhizae Radix (*gān cǎo*).



presentation. *Systematic Differentiation of Warm Pathogen Diseases* (溫病條辨 *Wēn bìng tiáo biàn*) points out four contraindications for White Tiger Decoction (*bái hǔ tāng*):

1. A pulse that is floating or wiry and thin
2. A pulse that is sinking
3. Lack of thirst
4. Lack of sweating

A sinking pulse, lack of thirst, or the absence of sweating is usually part of an ephedra or aconite presentation; they belong to the categories of cold and/or deficiency. Their nature and that of the gypsum presentation are exactly the opposite; thus, when they appear, the use of White Tiger Decoction (*bái hǔ tāng*) is prohibited.

I believe that in differentiating the White Tiger Decoction presentation it is especially important to pay attention to the tongue and pulse. The tongue coating must be dry and without any moisture. If the tongue coating is greasy, or glossy and moist, another formula would be appropriate. In addition, the White Tiger Decoction presentation pulse feels slippery, fast, and forceful, in addition to being flooding and large.

Yue reports treating a patient who had a high fever of 41.9°C (107.4°F) and diarrhea; two packets of White Tiger Decoction (*bái hǔ tāng*) were taken in succession, but the illness was unchanged. Careful inspection of the tongue revealed that although the coating was yellow, it was not dry. Furthermore, the patient had nausea and loose stools; this is not a White Tiger Decoction presentation. Switching to the use of Kudzu, Scutellaria, and Coptis Decoction (*gé gēn huáng qín huáng lián tāng*) brought about a cure.<sup>11</sup>

As there are similarities, the White Tiger Decoction presentation should be clearly differentiated from that of collapse from exhaustion, as profuse sweating and a relatively large pulse are also seen during a period of collapse. Furthermore, collapse frequently manifests during a high fever, so it is easy to confuse it with the White Tiger Decoction presentation. There are quite distinct differences between the two. The sweat of a collapse syndrome is a cold sweat; the four limbs are usually cold due to counterflow; the pulse is large but empty or slightly weak; and there is low blood pressure. If White Tiger Decoction (*bái hǔ tāng*) is prescribed erroneously in these cases, the side effects will be severe, so due care must be taken.

The White Tiger Decoction presentation should also be differentiated from the Cinnamon Twig Decoction presentation. Both of these formula presenta-

tions include sweating and a large, floating pulse. However, the fever of the White Tiger Decoction presentation is either a feeling of the body being hot or one with a very high temperature, and there is an intense feeling of thirst. These signs are not part of the Cinnamon Twig Decoction presentation.

## 6.2 White Tiger plus Ginseng Decoction

(白虎加入參湯 *bái hǔ jiā rén shēn tāng*)

SOURCE: *Discussion of Cold Damage*

Gypsum fibrosum ( <i>shí gāo</i> )	12-30g
Anemarrhenae Rhizoma ( <i>zhī mù</i> )	6-15g
Glycyrrhizae Radix ( <i>gān cǎo</i> )	3-6g
Nonglutinous rice ( <i>jīng mǐ</i> )	10g
Ginseng Radix ( <i>rén shēn</i> )	6-10g

This formula's pulse presentation is clearly stated in *Discussion of Cold Damage* (paragraph 26): "If after profuse sweating from taking Cinnamon Twig Decoction (*guì zhī tāng*) there is severe irritability and unquenchable thirst along with a large, flooding pulse, White Tiger plus Ginseng Decoction (*bái hǔ jiā rén shēn tāng*) masters it"; in paragraph 168: "For those where the exterior and interior both have heat, an occasional aversion to wind, and severe thirst with a dry tongue coating, irritability, and a desire to drink large amounts of fluids, White Tiger plus Ginseng Decoction (*bái hǔ jiā rén shēn tāng*) masters it"; and in paragraph 169: "Cold damage without a high fever, dry mouth with thirst, irritability, and the back has a slight aversion to cold, White Tiger plus Ginseng Decoction (*bái hǔ jiā rén shēn tāng*) masters it." The passages found in the original text—"after profuse sweating" (大汗出後 *dà hàn chū hòu*) and "desire to drink large amounts of fluids" (欲飲水數升 *yù yǐn shuǐ shù shēng*)—both express the patient's severe sense of thirst and the relatively severe depletion of body fluids that occurs after losing a large amount of fluids from profuse sweating. This condition and that of the high fever usually associated with the White Tiger Decoction presentation discussed above are not the same. From these passages, it can also be seen that the symptoms for which Zhang Zhong-Jing would use Ginseng Radix (*rén shēn*) were depletion of fluids after sweating and a dry mouth with thirst. Other than these signs, the patients themselves feel fidgety, have chest stuffiness, shortness of breath, poor appetite, epigastric focal distention with firmness, or have lost weight.