
Chapter 6

The Evidence of Safety

This chapter explores the *ngülchu tsodru chenmo* technique of making *tsotel* not only as a complex *menjor* practice that employs many other substances, such as the eight metals and eight minerals, but also as a spiritual and fundamentally sensory engagement with poisons in need of taming. Making *tsotel* is considered a *choga* (skilled practice) of taming, not only of mercury but also of any negativities surrounding the manufacturing event. In this chapter, it will become clear how making *tsotel* in a pharmacy re-enacts the early Tibetan subjugation myths introduced in Chapter 2, which can be summarized as: the entire taming process is not about taking something out from what is considered poisonous, but about transforming an existing poison into something beneficial.

Successful taming is also key to a toxic substance's safety. But how exactly do contemporary Tibetan physicians provide evidence that a substance has been tamed and made safe for themselves, their medicines, and their community? In my exploration of various mercury processing methods below, I argue that the amchi's sensory engagement with the transforming substance is at the core of the taming process and the construction of safety. It also influences how physicians assess the risk of working with different forms of mercury and how they protect themselves while doing so. Taken together, these analyses will allow us to draw insightful conclusions on the nature, status, and perceived toxicity and safety of mercury in Sowa Rigpa and see how risk assessments and "poison cultures" (Arnold 2016) are socially constructed.

Assessing risk

Risk is a social experience of an uncertain reality, not an absolute scientific value (Cordner 2016, 53).

Toxicity is a variable and is contingent on social contexts. This is demonstrated by recent studies on toxic substances from the fields of history, anthropology, and sociology, of which I will give three examples from South Asia and North America. The first is on how toxicity is shaped by historical ideas of poisons (Arnold 2016), the second is on the subjective perceptions of toxins through sensory engagement with chemicals (Shapiro 2015), and

the third example shows how toxicity is (re-)defined and negotiated by different stakeholders in pursuit of different goals (Cordner 2016). Each example highlights a different angle I consider essential to understanding the pharmaceutical nexus of Sowa Rigpa mercury practices, in particular, and of traditional Asian medicines in general.

First, David Arnold transports Buell's idea of the "toxic discourse" (Buell 1998) into South Asia, analyzing its "long history" and "close rhetorical association between concepts of pollution and poisoning" (Arnold 2013, 133; 2016, 12). Arnold demonstrates how in nineteenth-century India the words poison and pollution were employed almost synonymously by British colonial administrators, influencing urban public health activities. Pollution was polysemous in Indian poison culture. It coexisted as a religious concept, which demarcated social castes and regulated contact with bodily substances, alongside pollution as an environmental concept that, for example, shaped sanitary measures and the management of dead bodies. Not surprisingly, the poor were frequently targeted as causes of pollution, poisoning, and toxicity in urban India. This was paralleled by a pharmacological toxic discourse on available poisons (e.g. arsenic, opium, aconite) used in medicines as well as for murder and suicide. The emerging British medical jurisprudence was also propagated by British fears of anticolonial resistance. Arnold's examples raise questions on how specific socio-political fears of toxicity can develop into specific poison cultures. The ways in which certain ideological biases crept into the development of colonial toxicology also impacted the kind of authority given to science and the exchange between biomedical and indigenous medical systems (Arnold 2016, 15).

Notwithstanding the fact that toxic substances are harmful and available poisons cause deaths, all of these examples demonstrate how ideas of poisoning are culturally and historically constructed over time. Arnold also illustrates how "India's poison pasts still speak to its toxic present" (2016, 208), especially with the growing concerns about adulterated and contaminated food and medicinal raw ingredients, unregulated drugs, air pollution, and environmental chemical pollution. These are all core issues that have also been affecting safety perceptions of the various actors who make up the pharmaceutical nexus of the emerging Sowa Rigpa industry and the traditional medicine industry in Asia at large, and therefore should prompt us to reflect on ethical and environmental concerns of this industry. Chapter 7 will address some of these environmental toxicity concerns, which have impacted the making of traditional medicines in India today.

The second example relates to the notion of embodied sense of toxicity as an additional element to the pharmaceutical nexus of Tibetan mercury practices, introduced earlier in this book. Below, I present an ethnographic event of coating pills with roasted cinnabar or *chokla* that highlights how our own embodied sense of toxicity leads to different risk assessments of mercury's toxicity and safety. Here, Nicholas Shapiro's "Attuning to the Chemosphere" (2015) offers a culturally different but still valid example from the anthropological literature for comparison.

Shapiro ethnographically follows the toxicity of formaldehyde from toxic breathing spaces to human body experiences among residents across North America who have been exposed to chronic low-level formaldehyde. Shapiro (2015, 375–376) emphasizes the “deep phenomenology of bodily formaldehyde detection that focuses on visceral and indeterminate sensorial facilities” and explores bodily sensory impressions as the “epistemic basis for chemical knowledge of everyday, ongoing, and low-level intoxication.” While this level of exposure is quite different from the exposure to mercury fumes during rare *tsotel* events as well as when processing *chokla*, his phenomenological approach towards toxic substances allows for some comparison. Shapiro argues that “such microscopic encounters between bodies and toxicants are most readily sensed by less nameable and more diffuse sensory practices” (2015, 338), but nevertheless lead to a certain knowledge of and engagement with toxic chemicals.

Shapiro takes a phenomenological approach to chemistry and calls this process the “chemical sublime,” which here refers to a chemical transformation of a toxic substance from a solid/liquid state into vapor when heated. He uses the chemical sublime both as a practice and as an embodied experience in his case studies on formaldehyde microemissions in people’s homes causing various toxicity symptoms. His ethnography deciphers the concept of toxicity as a somatic variable that can potentially be perceived through our bodies even though sensory experiences are often diffuse and difficult to measure and evaluate. I allude to this in my analysis of the cultural *habitus* of toxicity and the differences in how my interlocutors and I reacted physically to different forms of mercury (mainly liquid mercury and fumes from heating cinnabar).

Below we learn about how Tibetan physicians assess mercury’s toxicity and evaluate its risks through their own embodied conceptualization of exposure, risk, and safety. The documented experiences have ranged from physicians feeling safe to sometimes experiencing physical discomfort—difficult to measure somatic variables. As we shall see, risk assessments depend largely on the frequency of exposure, the use of sulfur, the visible transformations of mercury’s character during the taming process, and the individual’s physiological response to the taming process.

The third example from the literature shows how risk assessments of toxic substances might play out on larger economic and political stages. This becomes relevant when approaching the pharmaceutical nexus as a method of ethnographic inquiry in order to rethink the role of global toxicity regulations for mercury-containing Asian medicines and question what is at stake in the cultural translation of toxicity. Alissa Corder (2016) illustrates how interpretations of science and risk assessments of toxic substances are manipulated and strategically used depending on the economic interest of certain stakeholders. With her case study on flame-retardants in the United States, Corder analyzes different modes of what she calls strategic science translation, which depend on how toxic risks are interpreted and communicated by different stakeholders, taking

advantage of the uncertainties that come with risk assessments. Her presentation of various conceptual risk formulas depends on how the terms “hazards” and “exposure” are defined, which varies widely and leads to different understandings of risk. With regard to flame-retardants in the United States, Cordner shows that the industry has more power to define risk and interpret science to their advantage in the process of influencing policy makers than the consumers and fire fighters who suffer the unsafe effects of flame-retardants. Cordner’s book teaches us that defining toxicity in today’s context is not only a question of applying science; it is also a question of how it is applied, by whom, and with what intention. I return to these questions in Chapter 7 and in the Conclusions.

For now, the above historical, anthropological, and sociological toxicity studies invite us to revisit our concepts of risk and safety, detecting underlying cultural ideas of what is considered dangerous. Boundaries of risk and safety are defined differently by different actors. Risk studies offer ample examples of the heterogeneous character of risk assessment, the analysis of which is beyond the scope of this book.²⁹² I present ethnographic examples from the Tibetan medical contexts of taming mercury to explore questions such as how safety is established and negotiated through, for example, subjective sensory perceptions of toxins, occupational safety measures, imposed legislation, and certain politics of toxicity.

The examples from the Tibetan world are not unusual in that they cross boundaries between what is considered potent on the one hand and toxic on the other. Tibetan physicians address poisons through meticulous *menjor* processing: the danger of mercury unleashes its very potential as a powerful medicine. These fluid boundaries are expressed in the Tibetan terms of *men* (alluding to efficacy and medicine) and *duk* (alluding to toxicity and poisons), which were introduced earlier. Anthropologists Sienna Craig (2012) and Jan van der Valk (2017, 2019) have shown that these boundaries are not straightforward but quite dynamic when determining “the full spectrum of potency—the ‘good’ and the ‘bad,’ the ‘wanted’ and the ‘unwanted’—without presuming the universal validity of biomedical notions of toxicity, side effects and risk” (van der Valk 2017, 205). Crossing such boundaries between the beneficial and the harmful might cause ambiguities since what we consider poisonous might be considered pure and safe in another culture.

There are many examples in medical history of how a poison can also become a medicine; the dichotomy of poison and medicine both intersect in the Greek term *pharmakon* (Grell et al. 2018). Paracelsus’ notion of “the dose makes the poison” strongly influenced the development of

292 For a brief summary of risk assessment and conceptual risk formulas see, for example, Cordner (2015a). For an example of how differently the risk of consuming methylmercury in tuna fish was assessed by different stakeholders, see Joyce (2012).

biomedical toxicology. Dose-response effects are fundamental to modern toxicology, culminating in the widespread use of chemotherapy, which is therapeutically effective, but at the same time harmful and experienced as toxic by most patients. “The dose makes the poison” is a limited paradigm for the Sowa Rigpa medical context (see van der Valk 2019), where poisons have been approached differently and—as we have seen in the case of mercury—intersect with broader cosmological and tantric ideas. This study on *tsotel* contributes to a re-assessment of the poison-medicine spectrum in that it shows that it is not only the dose that makes the poison but also the ways it is processed, and how it is “digested.”

The ratio between risk and benefit is indeed fluid, often difficult to define, and needs to be contextualized. Particularly revealing were those instances during fieldwork in which my own perceptions of safety clashed with those of Tibetan (and also Ayurvedic) physicians when boundaries of what is poisonous and thus dangerous fundamentally differed in expressions of our embodied sense of toxicity. As we shall see in the ethnographic example below, the risk assessment of processing cinnabar varied considerably between the physician processing and the ethnographer documenting it. In what follows, I unpack mercury-related notions of safety in Sowa Rigpa *menjor* practices and analyze how they are linked to concepts of taming. How is evidence of safety created and what is it based on?

COATING PILLS WITH CINNABAR

As we walked down the hill, along small paths and across terraced fields, Dr. Kelsang Dhonden, the nephew of the famous physician Dr. Yeshe Dhonden (introduced in Chapter 3) was on his phone listening to *WeChat* messages that had come in during the morning while he was assisting in his uncle’s private clinic. These were his few minutes off during a long day of work and he laughed heartily as he returned audio messages to his friends with jokes in Tibetan. I followed him downhill, struggling to keep up with his pace. We finally reached his new pharmacy, which he had set up with the help of a local Indian family who worked under his guidance. Kelsang was a young amchi and entrepreneur who combined a family lineage with Men-Tsee-Khang training, now working independently. He did everything from buying raw materials and supervising the cleaning and pre-processing of substances, to actually making medicines. A storeroom was packed with bags of pills, and some women were stitching up parcels, readying them for the mail.

Kelsang knew about my project and wanted to show me how to process *chokla*, which is used to coat certain pills. There are no standardized techniques for processing *chokla*; even the identification of the raw ingredient is not uniform among physicians. The head of the Dharamsala Men-Tsee-Khang Materia Medica Department, Dr. Tsering Norbu, who was trained in Lhasa, had a point to make on the identification: “Actually, *chokla* refers

to natural cinnabar rock; but nowadays only artificially made vermilion is available, which is called *dachu*. This is confusing because doctors continue to call it *chokla*.²⁹³ Moreover, the darkish-red powder after processing is also called *chokla*, although powdered cinnabar is typically called *tse*.

Sowa Rigpa attributes therapeutic efficacy to the use of roasted *chokla* powder, especially for broken bones and skin diseases. It also adds a warm reddish color to the pills, similar to the red coral color of which Tibetans are very fond. *Chokla* is used to coat, for example, Gawa 16, Gurkhyung, Mutik 25, and Samnor, as well as the precious pill Jumar 25. It is also an important ingredient in some formulas, such as Gurgum 13. Whether as an ingredient or as a coating, it is always processed and contributes its *nüpa* to the formula. Kelsang Dhonden explained: "*Chokla* is good for channels (*rtsa*), for bone density and to stop bleeding; it is good for all nerves." The formula Samnor²⁹⁴ especially requires *chokla*. Kelsang Dhonden explained:

Nowadays, at the Men-Tsee-Khang, Samnor medicine is made without *chokla*. But I am still using it, because without it Samnor does not have such a good effect on paralysis, muscle diseases, and brain damage. [...] For internal wounds Samnor is so effective. Especially sores inside the colon dry out and patients are fine; [...] patients with blood cancer take Samnor often for a long time, at least eight to ten months. [...] I know the Men-Tsee-Khang stopped *chokla* coating for safety reasons. If the procedure is not done well, then it will have mercury, which will be harmful; so you have to process it well.

The use of *chokla* among Tibetan *menjor* practitioners is controversial to say the least. Most small-scale pharmacies I visited do not use it at all. Those who use it believe that the mercury evaporates during the heating process. Mercury levels in Asian medicines became a contested issue during the late 1990s (see Chapter 7). About a decade later, at the end of 2010, the Men-Tsee-Khang discontinued the coating of pills with *chokla* because Hg levels of their tested pills were too high. The appearance of lead and arsenic in tested *chokla* was also troubling for Tibetan physicians.²⁹⁵ There was no talk about the UNEP mercury ban at the time.

The Men-Tsee-Khang-trained physician Dr. Tsering Thakchoe Drungtso was on the board of the Central Council of Tibetan Medicine (CCTM)²⁹⁶ when the Men-Tsee-Khang stopped using *chokla* for pill coating. In 2016, when Tibetan physicians had become more aware of the UNEP mercury ban, I interviewed him about the mercury and pill-coating issue (see also Chapter 7). He said:

293 Interview, Dharamsala, May 14, 2015. See Chapter 2 on the meanings of *dachu*.

294 Blaikie (2015) studied the social, clinical, and therapeutic significance of this formula in Ladakh.

295 Dr. Tenzin Namdul, personal communication, Dharamsala, May 2016.

296 The CCTM was founded in 2004 and regulates practitioners of Sowa Rigpa in exile. See Kloos (2011, 2016) and Blaikie (2016).

We just raised some questions: How can we improve the situation in the near future? How can we face all the questions about mercury toxicity that might come? We thought at least the amount of mercury would be less if we take out the *chokla* coating. We also have to do some research, whether the potency of the medicine is affected or not. We do not know. We should do research, because if it affects the potency, that is also difficult.

I asked, "So, right now if a pharmacy is recognized by the CCTM they can make *chokla*?" He responded, "That is quite OK. In India there is no objection, yet. The only concern is raised from outside, from Europe and other countries. [...] We cannot prove whether *chokla* is harmful; we have used it for thousands of years; that is the reason why we allow recognized pharmacies to use it."²⁹⁷

Some Men-Tsee-Khang physicians I spoke with supported the decision to discontinue the coating practices, but felt that when *chokla* was mentioned as an ingredient in a given formula, it could not be taken out, because it would change the efficacy of the entire formula. The decision to stop coating but continue using it as an ingredient was a compromise that would not satisfy any regulations based on counting atoms of mercury in a substance or compound. However, it was a conscious step aimed at reducing the use of cinnabar in the pharmacy. It also raised questions about what constitutes an ingredient and how and for what reasons a formula could be changed (Gerke 2018a). For Kelsang Dhonden, the *chokla* coating of the pills was not only a beautifier, but also added considerable *nüpa* to the medicine. This he knew, not through research, but through personal clinical experience observing his patients under treatment with Samnor, with and without *chokla* coating.

Kelsang Dhonden's pharmacy was one of the few recognized pharmacies that used *chokla*. A committee of four members (from the Men-Tsee-Khang, the CCTM, the Health Department, and the Tibetan Welfare Office) had inspected and certified his pharmacy. He proudly showed me the certificate, framed on the wall between shelves of bagged pills. He had been trained in the *chokla* technique by both the Men-Tsee-Khang and his uncle, but followed his uncle's technique, roasting the cinnabar for a lot longer, which he considered safer.

At his pharmacy, Kelsang Dhonden prepared everything for the *chokla* processing. First, he showed me a piece of the artificial cinnabar he had bought in the open market in Amritsar (Fig. 34). His female assistant crushed it to a fine powder in a steel container with a metal mortar and pestle (Fig. 35). While crushing it one could see shiny mercury, but with trituration it turned into an even, bright red-colored powder, well-known among artists across Asia and Europe as vermilion pigment (Miguel et al. 2014). Kelsang Dhonden tested its fineness with his finger. The powder had to

297 Interview, McLeod Ganj, March 25, 2016.



Figure 34: A piece of artificial cinnabar before grinding (right) and ground up powdered cinnabar (left). Photo by author (Gerke 2015/CC-BY-SA 4.0).



Figure 35: Grinding cinnabar in a metal mortar with a pestle. Photo by author (Gerke 2015/CC-BY-SA 4.0).

be so finely triturated that it would fill the lines of his fingerprints (Fig. 36). He and his assistant then roasted the crimson red powder on a metal pan (Fig. 37) over a low gas flame until the color darkened (Fig. 38). The change of color indicated the level of detoxification. "If you roast *chokla*, you have to roast it for the right amount of time," Kelsang Dhonden explained. "You have to check the color. When it has the right darkness, then it can be used safely to coat the pills" (Fig. 39).

Kelsang Dhonden prepared *chokla* twice a year, each time around four kilograms, which was enough to coat his pills. While he heated the cinnabar, a sulfuric smell hung in the air. Sulfur reacts with oxygen when burned and forms sulfur dioxide, which can cause breathing problems. He wore only a simple cloth mask to cover his mouth and had handed one to me and his female assistant as well. I kept my distance and stayed outside, only coming close to take photos while holding my breath. At the end, I was the one coughing; they did not. He came out into daylight every few minutes to show me the change of color of the cinnabar powder that he mixed with a metal tea spoon. After about twenty minutes, he was satisfied with the darkish red hue.

I could not get myself to stay inside the room where cinnabar was heated and was surprised to see Kelsang Dhonden and his Indian assistant dealing with the substance so casually. He knew that, as part of the processing, mercury would be burned off into the air. The end product was considered safe. Questioning him on the safety of the procedure, he said: "I know mercury is toxic, especially the fumes. But if you only do a small quantity it is not a problem. I only make *chokla* twice a year and process only four to five kilos. I only need two to three spoonfuls of powdered *chokla* to coat thirty to forty kilos of pills. When I require more *chokla*, I will process it outside."

We both went to the water tap beyond the veranda and thoroughly washed our hands and rinsed our mouths with water. The sulfur stench stayed with me all day, permeating my clothes and hair; concerns about the safety of this technique, especially for those carrying it out, remained with me as well. However, I was grateful to have finally witnessed and documented this processing technique—I had waited a year for the opportunity. I was thankful since Kelsang Dhonden was helpful and open, allowing me to document and photograph his activities extensively, especially after some of my other attempts to witness mercury processing had been unsuccessful. Observing the making of *chokla* also had no gender issues attached to it. His female assistant was handling the cinnabar, the trituration, and the roasting. It was a totally different technique, not related to *tsotel* and any of the gendered cosmologies explored in the previous chapter.

How did Kelsang Dhonden establish his evidence of safety? The ethnographic account illustrates how the taming process is deeply related to the physician's direct sense experiences and the visually observable changes during processing. For him, the safety of the final product was established



Figure 36: Testing the level of trituration.
Photo by author (Gerke 2015/CC-BY-SA 4.0).



Figure 37: Beginning to roast trituated cinnabar powder.
Photo by author (Gerke 2015/CC-BY-SA 4.0).



Figure 38: The transformed darkish-red color of processed cinnabar.
Photo by author (Gerke 2015/CC-BY-SA 4.0).



Figure 39: Samnor pills coated with *chokla*.
Photo by author (Gerke 2015/CC-BY-SA 4.0).

through the color change of the cinnabar powder, first when grinding vermilion and then while heating it. Time also played a role, since he judged a longer roasting safer than a shorter one. As for his own safety, he knew that mercury fumes were toxic and that long-term exposure would affect him. He assessed his occupational risk as low when processing small amounts infrequently.

It is beyond the scope of this project to research the history of the use of *chokla* in Sowa Rigpa and how and when it was established in Tibet. Working with vermilion as a pigment in art was widespread across Asia and Europe, and techniques of creating vermilion from mercury and sulfur were known early on (Miguel et al. 2014). The early eighteenth-century Tibetan physician and scholar Deumar Geshe Tendzin Püntsock describes the use of vermilion to create different shades of brown, maroon, and pink colors for painting; many of the ingredients he lists are also known as medicinal in Sowa Rigpa (Onoda 2011).

Asian medical traditions have handled the heating of cinnabar varyingly. For example, Liu et al. (2008, 812, 814) state that the contemporary Chinese pharmacopoeia restricts the heating of cinnabar to reduce toxicity through escaping mercury vapors. In Arabic and Unani-Tibb²⁹⁸ medicine, processed cinnabar is known as “killed cinnabar” or *Kushta Sangraf* (Preckel 2015, 915, 922–923). It is triturated with herbal juices for a long time, and is considered a strong rejuvenator. The Ayurvedic practitioner Andrew Mason²⁹⁹ describes a Unani-Tibb preparation of *Kushta Sangraf* through applying heat using cow dung cakes (Mason 2014, 198–199). An energy-dispersive x-ray analysis (EDX, which detects the elements in a substance) of a *Kushta Sangraf* sample showed the absence of mercury; sulfur had largely oxidized to sulfur dioxide (SO₂). What was left was “silicon, calcium and iron, with trace amounts of sulfur, aluminum, phosphorus, potassium and sodium, typical of rock forming minerals” (2014, 200). Since there is no standardization of the different processes of heating cinnabar, and Kelsang Dhonden’s sample was not tested, we do not know its mercury and sulfur content.

I interviewed several other independent pharmacists on their use of *chokla*. Men-Tsee-Khang-trained Dr. Namgyal Qusar, who does not use any mercury in his own pharmacy, once experienced physical discomfort during *chokla* processing. In his case, what Shapiro would have called the “chemical sublime,” an “embodied apprehension of human vulnerability” (Shapiro 2015, 369) led to a change in medical practice:

In my case, I never used mercury from the beginning. It is much too risky. I used *chokla*, that is right, but for the last eight years we

298 Unani Tibb refers to the Graeco-Arab medicine that is practiced in South Asia.

299 Mason trained as an Ayurvedic practitioner in the UK and spent years in Sri Lanka studying traditional techniques of making *rasāyana* tonics. He offers *rasāyana* workshops in the UK and publishes processing techniques and laboratory analyses of some of his products (Mason 2014).

stopped. Once, I felt uncomfortable from the fumes while roasting it. Then I thought this is not good for me, even if the final product might be safe. So, I decided to stop making *chokla*. Also, cinnabar used to cost 300 rupees a kilo; then it went up to 3,000 rupees a kilo. It was turning out too expensive.³⁰⁰

Several of the private amchi I interviewed export their medicines abroad and are aware of the mercury toxicity issues. They do not want to create problems for their clients abroad and thus do not use any mercury or cinnabar. Though they still consider *chokla* of medicinal value, they do not want to take the risk. Alternative herbal coating techniques have been adopted instead. Trogawa Rinpoche in Darjeeling developed an herbal substitute coating from red sandalwood powder.³⁰¹ The Men-Tsee-Khang has also developed herbal coating techniques after phasing out *chokla* coating in 2010. Of the seven private pharmacies I visited in the Dharamsala area, by 2016 four used *chokla* for coating. These were small-scale private pharmacies, run largely by family lineage amchi who relied on their long-term practice and experience and did not seem to be affected by institutional oversight and the global mercury toxicity issues.

In the following, I discuss how Tibetan physicians assess the safety of short and long mercury taming techniques that are mentioned across Tibetan medical texts. They typically begin with raw, liquid mercury, which is transformed through interaction with preprocessed sulfur and/or numerous other ingredients into various forms of mercury sulfide compounds, which are then used as an ingredient in specific formulas.

Short mercury processing techniques and their evaluations of safety

*There are an inconceivable number of different procedures of cooking, washing, purifying, and killing [mercury]; cooking [it] for one or two years, for one or two months, or for days and hours, and so forth (Zurkhar Nyamnyi Dorjé [1439–1475]).*³⁰²

With this statement, the fifteenth-century physician Zurkhar Nyamnyi Dorjé, representative of the Zur medical lineage and practitioner of the Buddhist Kagyü tradition, opens the section on precious black pill formulations in a long chapter on treating poisoning. Although he was aware

300 Interview, Sidhpur, May 2016.

301 He, however, used “detoxified *chokla* when required as an ingredient.” Teinlay Palsang Trogawa, personal communication, Vienna, December 2016.

302 Yonten Gyatso’s (1991, 40) translation of: *de yang btso bkru sbyang gsad cho ga’i phyag len mi ’dra ba bsam gyis mi khyab ste/ lo gcig gnyis btso ba dang / de bzhin zla ba gcig gnyis/ zhag dang chu tshod sogs du mar ’tshod pa dangl*. Zurkhar Nyamnyi Dorjé (1993, 287 / 13–15).

of the numerous mercury processing techniques that circulated in Tibet at the time, he was of the opinion that among “all these, the most outstanding [method], more profound than the profound ones, with undiminished blessings of the *ḍākinīs* and an unbroken lineage in practice of highly realized yogis, with less complication and great purpose” was the *tsodru chenmo* technique that Orgyenpa had brought to Tibet two centuries earlier (Gyatso 1991, 40).³⁰³

Nevertheless, different processing methods continued to occupy Tibetan medical authors for many centuries. Deumar Geshe Tendzin Püntsock, the famous Drukpa Kagyü physician from Konjo, records fifteen methods of taming mercury.³⁰⁴ They represent a systematic collection of heterogeneous mercury processing techniques of the early to mid-eighteenth century in Tibet. Of the fifteen methods—which also include spiritual techniques of taming mercury through mantras called *ngak dül* (*sngags 'dul*)—only seven contain sulfur. We do not know if any of these methods were actually practiced during Deumar’s time and, if so, to what extent. I found that only three of the fifteen methods are practiced under the same name today among Tibetan physicians in India and Nepal: the hot taming called *tsadül*, the cold taming called *drangdül*, and Orgyenpa’s *tsodru chenmo* technique to make *tsotel*.

Dr. Dawa Ridrak (introduced in Chapter 4) copied eleven of Deumar’s taming methods largely verbatim into his contemporary *menjor* book (2003, 399/22–401/25), followed by a detailed description of Orgyenpa’s *tsodru chenmo* technique. He also added two more versions of the hot and cold taming methods, both of which include sulfur (Fig. 40). Below, I discuss the hot and cold methods and show that relatively recent changes in these processing techniques center on the use of sulfur. I suggest that these modifications might indicate changing perceptions of the safety of mercury compounds over time.

THE IMPORTANCE OF SULFUR: THE HOT AND COLD TAMING OF MERCURY

Today there are two short processing methods for mercury in Sowa Rigpa. The first method is known as hot taming, or *tsadül*. The second is known as cold taming, or *drangdül*, which is frequently also called “taming [with] tin,” or *kardül*, referring to a silvery-white metal ingredient, *kar* (*dkar*), by abbreviating *shakar* (*bsha' dkar*), which means tin. Some call *kardül* the “medium *drangdül*” (*grang 'dul 'bring po*), referring to Tibetan practices of transmitting formulas and *menjor* practices in minor, medium, and major versions.

303 Yonten Gyatso’s translation of: *kun las khyad par du 'phags shing zab pa las kyang ches zab pa mkha' 'gro'i byin rlabs ma yal ba/ grub thob bryud pa'i phyag len ma 'phyugs pa/ tshogs chung don che ba'i gdams pa/*. Zurkhar Nyamnyi Dorjé (1993, 287/18–288/2).

304 See Deumar Tendzin Püntsock (2009, 577/16–585/13); Dawa Ridrak lists eleven of these methods (2003, 399/22–401/25) and Sonam Dolma (2013, 115) fourteen.



Figure 40: Unprocessed yellow sulfur, Khari Baoli market, Old Delhi, March 2016.
Photo: Thomas K. Shor (Shor 2016/CC-BY-SA 4.0).

These versions differ according to grades of technical difficulty and availability of precious ingredients and might also affect lines of knowledge transmission (Czaja 2013). They demonstrate the inherent flexibility of *menjor* practices, characteristic of Sowa Rigpa and its many lineages and orally transmitted *laklen*, which by their very nature defy standardization (Gerke 2018a). Most physicians I interviewed use *kardül* and *drangdül* interchangeably, also referring to the final compound, but several texts present them as different methods/compounds (e.g. Nyima Tséring 2009, 59–70), which can easily cause confusion.

The labels hot and cold generally refer to therapeutic efficacy: the cold method is beneficial for hot diseases and vice versa. It also sometimes refers to the temperature applied during processing, but this is not consistent since some cold techniques involve heating mercury. Notably, hot

and cold methods of taming substances are not only applied to mercury, but also to other substances, for example types of calcite called *chongzhi* (*cong zhi*; Tupten Tséring 1990, 361/14–20). As processed compounds, *drangdül*, *kardül*, or *tsadül* are added to specific medicines to contribute to and increase their potency, again with great variety.³⁰⁵ For example, the formula Ngülchu 18 can be found in the literature with either *tsadül* or *kardül*.³⁰⁶ Interviewing physicians also revealed variety: Amchi Wangchuk Lama in Kathmandu adds *tsadül* to Ngülchu 18; the Men-Tsee-Khang in Dharamsala adds *kardül*; but both formulas circulate under the same name.

Drangdül and *tsadül* do not appear in the *Four Treatises* and are mentioned only very briefly in the main commentaries of the sixteenth and seventeenth century, written by Zurkhar Lodrö Gyelpo (1509–1579) and Dési Sangyé Gyatso. They both list them in the chapter on purgative therapies, briefly stating that *tsadül* is beneficial for infections and *chuser* (*chuser*) diseases while *drangdül* treats other “old” or chronic diseases (Zurkhar Lodrö Gyelpo 1991, 657/24–25; Sangyé Gyatso 1982, 1314/13–14). Later medical texts mention the hot and cold methods, but with strikingly different techniques and ingredients, as well as different therapeutic applications. Comparing and translating several of these descriptions by eighteenth- to twenty-first-century authors, I made two observations.

First, over time descriptions of the cold methods show increasingly more similarities to certain phases of making *tsotel*, although they are simplified. For example, in the cold methods they use tin or *shakar* as the additional metal and mustard oil, while *tsotel* processing requires eight metals and the use of five different types of oil. These simplified ingredients lend the impression that the cold methods were at some point established as more simplified processing methods to replace *tsotel*, possibly for practitioners who could not afford or obtain the more elaborate and expensive ingredients. One such example of *drangdül* substituting for *tsotel* is found at the Men-Tsee-Khang in India, where they prepared the precious pill Mangjor Chenmo with *drangdül* a decade before they first were able to make *tsotel* in 1982.³⁰⁷

Second, earlier textual descriptions of *drangdül* and *tsadül* do not mention sulfur (e.g. Deumar Tendzin Püntsock 2009, 583/3–11), whereas most of

305 They are added variously to Dashed 37, Gawa 16, Gurkhyung Chakdor, Goyu Dépak, Jangchö 37, Khyunga Nila, Ngülchu 18, Nyenpo 18, Sarkhyung, Sengdeng 25, Yukhyung Karnen, and Yukar (Amchi Wangchuk Lama, personal communication, Kathmandu, December 2011 and Dr. Ngawang Soepa, personal communication, Dharamsala, December 2012). See also Sallon et al. (2017, 327).

306 The formula includes *tsadül* in Khyenrap Norbu (2007, 154/5), Tsering Norbu (2005, 134/3), referring to the *Relics of Countless Oral Instructions* by Zurkhar Nyamnyi Dorjé (1993), and in the Chinese Pharmacopoeia (Ministry of Health [PRC] 2000, 236/2). Dawa Ridrak (2003, 147/15) lists the formula with *kardül*, reflecting more recent Men-Tsee-Khang practice.

307 Dr. Namgyal Tsering, interview, New York, October 13, 2014. See also Chapter 3.

the later techniques circulating under the same names do involve the trituration of mercury with sulfur. For example, in 2011, Amchi Wangchuk Lama in Kathmandu showed me a detailed description of *drangdül* and *tsadül* with sulfur by Tupten Tséring (1990, 360/18–361/13), who was the last principal of the Chakpori Medical College in Lhasa before its destruction by the People's Liberation Army in 1959; he later worked at the Mentsikhang in Lhasa. Although Amchi Wangchuk practiced both techniques according to his own lineage that he had received back in Kyirong, southwestern Tibet, he thought Tupten Tséring's description was good.

While these textually recorded methods might not necessarily correspond to actual practice, they demonstrate the variety of heterogeneous mercury processing techniques passed down textually under the same names, copied and often modified from one text to the next. As we shall see, in practice, amchi follow their teachers' oral transmissions rather than the texts, which are often not updated. The next two sections will explore the two short taming methods in more detail, particularly considering their perceived safety and how they differ from making *tsotel*.

THE HOT TAMING (*TSADÜL*)

The *tsadül* methods found across Tibetan medical texts are very heterogeneous and show a rather confusing picture. Deumar Tendzin Püntsock (2009, 583/9–11) describes the hot method as boiling mercury with fermented barley beer (*chang*), unadulterated red rock salt (*tshwa dmar lhad med*), and soda (*bul tog*) in molten bone-marrow grease (*zhun rkang tshil*). The liquid is filtered three times, until finally, everything is poured into melted fresh butter (*mar gsar*) and cooked.

This description includes only basic elements of the techniques practiced today and entirely leaves out sulfur. Tupten Tséring's description of the hot method written around the 1950s has no resemblance to Deumar's version. His way of making *tsadül* is a simple trituration of mercury with sulfur (similar to the processing step called "meeting the enemy" in making *tsotel*). The same amounts of pre-processed sulfur and non-processed mercury are triturated in a heated stone mortar, *do zhong* (*rdo gzhong*), "pre-heated by the sun to the extent that you cannot touch it with your hand," until the mercury is "without even a hint of brightness" and the mixture turns "black, deep-blue in color. After that it may be used in medicine."³⁰⁸ A similar description is found in Namgyal Tsering (1997, 15/9–13). Dawa Ridrak briefly states that making *tsadül* follows the same method as *kardül*, but it is heated without tin and lead (Dawa Ridrak 2003, 401/24–25). Gen Gojo Wangdu explained during the Kathmandu workshop³⁰⁹ that the hot method is believed to tame the "three poisons of mercury," *ngülchü duk*

308 Translated from Tupten Tséring (1990, 361/8–9): [...] *nyi mar bsros nas lag pas reg mi bzod pa'i* [...] *dngul chu'i 'od cung zad kyang med pa nag mthing ma song bar du dbur rjes sman nang bed spyod btang chog*.

309 Translated from a video recording of the Sowa Rigpa workshop in Kathmandu (December 6, 2011) by Tenzin Demey, Dharamsala.

sum (*dn̄gul chu'i dug gsum*; see next section) “not fully, but to the extent of not being harmful,” but he did not specify which type of *tsadül* this refers to.

THE COLD TAMING (*DRANGDÜL*)

Deumar Tendzin Püntsoḳ (2009, 583/9–11) describes *drangdül* only briefly and does not mention sulfur. Accordingly, mercury is rubbed with salt (*tshwa*) and sour fermented barley beer for seven days. Thereafter, it is boiled in “black butter” (*mar nag*), translated to me by contemporary physicians as mustard oil. When comparing more elaborate descriptions of *drangdül* in more recent texts, one realizes that—though shorter and simplified—they are similar to the four processing phases of *tsotel* (see next section).

In summary, according to Tupten Tséring (1990, 360/18–361/6), *drangdül* involves rubbing liquid mercury with the powder of *gapiposum* (ginger, long pepper, and black pepper) in a goat’s skin bag for eight hours to remove the oxidation or rust called *ya* (*g.ya'*). In conversation, Tibetan physicians largely used the English term rust for *ya*, referring to external impurities, stains, and oxidized particles on the surface of metallic mercury.

The technique of making *drangdül* is much shorter but very similar to the first phase of making *tsotel*, called “removing the rust/oxide” or *ya chi* (*g.ya' physis*). Mercury is then boiled for several hours in various types of animal urine, washed frequently with water, boiled for several hours with the sour juice of *tarbu* (seabuckthorn berries), and again rinsed many times with water. This process is meant to cleanse the mercury of all kinds of *ya* and adulterants. It is similar to the second phase of *tsotel* making, which is more elaborate and called “expelling the rust/oxide liquid” or *ya khu dön* (*g.ya' khu 'don*). Then, mustard oil is heated in an iron pan and mercury is boiled in this oil for several hours together with very thin sheets of pre-processed tin (some *kardül* versions also add pre-processed lead, *zha nyé* [*zha nyé*]). This is a simplified version of the much longer and more complex third step of making *tsotel*: the “cooking and washing” process, *tsodru*. Finally, Tupten Tséring concludes, the mixture is triturated in a stone mortar with pre-processed yellow sulfur, or *muzi*, into a fine powder of a blackish deep blue color until no silvery brightness remains. In the making of *tsotel* this corresponds to the last and more elaborate phase of “meeting the enemy,” or *dratré*, where mercury is triturated with sulfur.

There are of course detailed textual descriptions of both short taming methods in Sowa Riga textbooks published by Tibetan physicians in the PRC (e.g. Tsüntargyel 2007).³¹⁰ However, since *menjor* practice often differs from what we find in texts, here I analyze publications by Men-Tsee-Khang

310 Amchi Gege of the Bonpo medical school in Nepal followed the text by Tsojé Jikmé Namkha Dorjé (2006) to teach *tsadül* and *drangdül*, but made *tsadül* only once. Amchi Nyima Sampel, personal communication, September 11, 2013, IASTAM conference, South Korea.

physicians in India, which I was able to follow up with interviews in order to document the recent changes introduced to these techniques by experienced *menjor* experts at the Men-Tsee-Khang in Dharamsala.

There are two textual versions of *kardül* published by contemporary physicians from the Men-Tsee-Khang in India. Dawa Ridrak's *kardül* description (2003, 401/13–23) is strikingly similar to Tupten Tséring's *drangdül* method from Lhasa (1990, 360/18–361/6), described above. The two main differences are the length of the *ya chi* method (two days instead of only eight hours) and the additional inclusion of lead in the boiling process. The second published *kardül* method is found in Namgyal Tsering (1997, 12/6–15/2), who also notes that lead, tin, and sulfur have to be pre-processed.

I only began to understand these variations and how they link up with perceptions of safety when I consulted Dr. Dorje Damdul, a Men-Tsee-Khang-trained Tibetan physician and associate professor at the Sowa Rigpa Department at CHITS. He explained:

Basically, *tsadül* is the same method as *drangdül*. Only they do not add lead and tin, and also no oil, to *tsadül*. Now sometimes they do not add lead at all in *drangdül* because people think it is toxic, so they stopped using it as well. These changes are not always written down in the text, but it is practiced that way. No one has updated the literature.³¹¹

Dr. Dorje Damdul thought the most up-to-date descriptions of the two processing methods were written by Dr. Namgyal Tsering (1997), who made *tsotel* several times at the Men-Tsee-Khang, once as the leading physician (see Appendix B). Dr. Namgyal Tsering states that *tsadül* has many traditions, and the one taught at the Men-Tsee-Khang is more elaborate and less harmful; it definitely involves sulfur. He writes:

Most books mention the practice that during the *tsadül* taming there is no need of cleaning the *ya* and extracting the *duk* to cast away the untamed, but in our tradition, just as with the *tsodru* [process of making *tsotel*], if one cleans the *ya* and extracts the *duk*, then it is less harmful for the digestive power of the stomach and the sense faculties, etc. It [the tamed mercury compound] is rather perceived to be particularly "smooth." This was mentioned by my *menjor* teacher, [and] that is sufficient for me. [...] During *tsadül*, cleaning the *ya* [...] is similar to the above [mentioned] *drangdül*; one must apply the same method.³¹²

311 Interview, Sarnath, December 21, 2012.

312 Translated from Namgyal Tsering (1997: 15/3–9): *phyag deb mang bar tsha 'dul la dngul chu g.ya' phyis dug 'don byed mi dgos par rgod po btang srol 'dug kyang rang lugs la btso bkru'i skabs ltar g.ya' phyis dug 'don byas na pho ba'i 'ju stobs dang dbang po sogs la mi gnod cing 'jam pa'i khyad par mthong zhing sman sbyor*

Dr. Namgyal Tsering also explains that none of these methods could be practiced without the “seeing transmission,” as visually observed when guided by a teacher. He further states that Tibetan scholars gave more importance to the hands-on practical transmission of mercury processing and therefore “did not write clearly [about the practice]” (*gsal bar bkod ma gnang bas*, Namgyal Tsering 1997, 16/6–7).

In summary, this short textual excursion demonstrates that mercury-processing techniques changed over time and that the shorter cold and hot methods were modified considerably from Deumar’s description in the early eighteenth century. As far as I know, only three mercury processing methods are currently practiced among Sowa Rigpa practitioners in India and Nepal (*drangdül/kardül*, *tsadül*, and *tsotel*), all of them containing sulfur. The short methods transmitted by the Men-Tsee-Khang in India today are in fact shorter versions of making *tsotel*; *drangdül/kardül* are similar to the first phase of making *tsotel*. *Tsadül* now includes all stages of making *drangdül*, except the heating with tin and/or lead (which is now usually left out). It also omits the step of boiling mercury in oil (which Ama Lobsang practiced in the 1980s, see Chapter 5), but includes the trituration of mercury with sulfur.

The main difference between the two methods is the amount of time and number of processing steps involved, which reintroduces the discussion of perceptions of safety. Making *drangdül/kardül* takes only a few days; *tsadül* can be made in a few hours. The cold method is considered safer by Tibetan *menjor* specialists, since mercury is supposed to “become more stable during the longer processing.”³¹³ As the senior Men-Tsee-Khang physician Dr. Choelothar explained, “All recipes of *kardül* and *tsadül* have been enlarged by additional safety measures of doing *ya khu dön* and *ya chi*.”³¹⁴ Nevertheless, the Men-Tsee-Khang stopped using the hot method around the early 1990s.³¹⁵ Dr. Tenzin Thaye explained that they considered the processing of *tsadül* “too short, and not very safe.”³¹⁶ As of the time of writing, it is only made by a few independent, small-scale pharmacies.

I conclude that the principle techniques that survived centuries of *menjor* experience with mercury and are practiced by Tibetan physicians today in India all build on Orgyenpa’s *tsodru chenmo* method, and that perceptions of safety are mainly, but not exclusively, based on the necessity

rgan lags kyis kyang de ltar gsungs pas de rang chog/ tsha 'dul la g.ya' phyi [...] gong gi grang 'dul skabs dang gcig pas rigs 'gre dgos/.

313 Dr. Tenzin Thaye, personal communication, McLeod Ganj, May 2016.

314 Personal communication, Chontra, June 2016.

315 Dr. Dorje Damdul still made *tsadül* at the Men-Tsee-Khang in the 1980s. Dr. Namgyal Tsering’s description of *tsadül* is from 1987, though published in 1997. Dr. Tenzin Thaye, who came to the Men-Tsee-Khang a few years later, never saw it during his time. I assume they stopped making it sometime in the early 1990s.

316 Personal communication, McLeod Ganj, December 7, 2014.

of triturating mercury with sulfur.³¹⁷ However, to conclude from the above that the main aspect of mercury processing is making mercury sulfide is missing the essence of the taming process, which is a lot more time-consuming and involves many steps. As Dr. Tenzin Thaye explained:

I think that if you just mix mercury with sulfur, it still has *duk*. Only when purifying all the substances is it usable. Just triturating mercury with sulfur is not enough. I would not take it, it is not safe.³¹⁸

So what exactly are the *duk* of mercury and how is safety fully established in the *tsodru chenmo* taming process? In the following analysis I focus on the relationship the *menjor* specialists processing mercury have with the metal and how they engage their senses to determine its safety in its various stages of taming. Then I discuss their methods of protecting themselves from mercury toxicity.

Taming the poisons of mercury: The long processing technique *Tsodru Chenmo*

Sulfur is like an atom bomb. When mercury meets sulfur, it totally changes, and the three poisons are really transformed (Dr. Choelothar).³¹⁹

During *tsodru chenmo* mercury is tamed through confronting it with many substances that bind and transform its poisonous nature, and “invoke the essence” (*bcud du 'gugs pa*, Dawa Ridrak 2003, 420/14). For Tibetan physicians, *ngülchu* has many poisons. Their textual descriptions paint a rough character: mercury is heavy, penetrating, sticky, mobile or fast, wild, and full of rust. These modalities are expressed in Tibetan terms of “poison of heaviness” or *chiba duk* (*lci ba'i dug*), the “poison of penetration” or *bikpé duk* (*'bigs pa'i dug*), the “poison of adherence” or *tsi duk* (*rtsi'i dug*), the “poison of mobility” or *yoba duk* (*g.yo ba'i dug*), the “poison of wildness” *göpé duk* (*rgod pa'i dug*), and the “poison of rust/oxide” or *ya duk* (*g.ya'i dug*). All of these *duk* have to be tamed during processing. The focus is on manipulating the qualities of mercury's character with other substances. For example, the poisons of mobility and wildness will be bound through the pre-processed eight metals (iron, lead, copper, brass, bronze, gold, silver, and tin) during manufacturing.

317 It might be worthwhile to investigate a parallel, though earlier development in Sanskrit medical texts here. Wujastyk (2019, 78) notes that sulfur was rarely mentioned in Sanskrit medical works before the eleventh century CE and that “early Sanskrit medical works did not include sulfur in their descriptions of making iron tonics or other *rasāyana* formulae [...], but it seems to have become a more common ingredient after the eleventh century.”

318 Personal communication, McLeod Ganj, December 7, 2014.

319 Personal communication, Chontra, May 6, 2016.

They will become immobile and tame, while the poisons of heaviness and penetration will be “devoured” by the eight minerals, making mercury light.

The eight minerals are difficult to identify. Their scientific identification and illustrations in modern Tibetan *materia medica* differ; I therefore use their Tibetan terms and provide approximate identifications.³²⁰ Dr. Tsering Norbu, the head of the Materia Medica Department at the Men-Tsee-Khang, explained that the existing identifications of the eight minerals are often wrong and the substances available in the market frequently fake. They have to be carefully checked. The eight minerals are first pre-processed into a powder and then used to “eat the toxins of mercury.”³²¹ Therefore, they are also called the eight devouring minerals, or *zajé kham gyé* (*za byed khams brgyad*).

Dr. Penpa Tsering, who trained at the Men-Tsee-Khang and established his own pharmacy in the Dharamsala area, where he does not use mercury, said the texts are not very clear about which type of poison is affected exactly by which type of processing. However, texts warn how *duk* will collectively affect the body if improperly processed. In the *menjor* texts, the poisons of mercury are often conflated into the single label *chibik*, referring to the first two poisons of heaviness and penetration. Dr. Choelothar said that *yoba duk* (poison of mobility) is a more familiar term than *tsi duk* (poison of adherence), since it refers to the very visible mobility of mercury,³²² but most texts just use *chibik*. In turn, Dawa Ridrak directs that “the three main poisons” (*dngul chu dug gsum*)—those of heaviness, penetration, and adherence—all must be made “smooth” (*jam*) through cooking the mercury with various substances (Dawa Ridrak 2003, 421 / 5). Below, I explore how Tibetan physicians perceive and describe the characteristics of some of the main poisons and outline the related methods of taming. They also conduct certain tests to verify whether the taming of these poisons has been successful or not.

THE POISON OF HEAVINESS

As anyone who has held a small container of liquid mercury can attest, the specific gravity of mercury is very high. Tibetan physicians interpret this heavy characteristic in terms of Sowa Rigpa cosmologies, somatic

320 The eight minerals with varying existing identifications are: (1) sour-water stone (*chu skyur rdo* or *rdo chu*), which is described as a calcareous sinter, CaCO_3 , “a solidified deposit formed at a spring and having a sour taste” (Gyatso 1991, 48), also identified as a type of actinolite (Clark 1995, 135); (2) lepidolite, also called red mica (*lhang tsher dmar po*); (3) gold ore (*gser rdo*), a chalcopyrite, CuFeS_2 (Kelden Nyima 2010, 71); (4) orpiment (*ba bla*), an arsenic trisulfide, As_2S_3 ; (5) magnetite (*khab len*), a magnetic iron ore, Fe_3O_4 ; (6) pyrite (*pha wang long bu*, also *pha bang long bu*), which is an iron sulfide, FeS_2 (Pasang Yonten 1998, 139), also identified by Dan Martin as galena, which is lead sulfide, PbS (THL 2011); (7) realgar (*ldong ros*), an arsenic II sulfide, AsS ; and (8) silver ore (*dngul rdo*) identified as a pyrargyrite, Ag_3SbS_3 (Kelden Nyima 2010, 72). Several of these minerals contain sulfur. See Simioli (2015, 42) for a different set of identifications.

321 Interview, Dharamsala, May 14, 2015.

322 Personal communication, Chontra, May 6, 2016.

physiologies, and the basic principles of *menjor* practice: the five elements (*byung ba lnga*), the eight characteristics (*nus pa brgyad*), and the three *nyépa* (*nyes pa gsum*).³²³ With these modalities Sowa Rigpa theory explains the complex metabolism of poisons in the body. The Men-Tsee-Khang-trained female physician Dr. Sonam Dolma³²⁴ wrote about the effects of *chiba duk* on the body if one were to consume unprocessed mercury:

The heavy characteristics would increase the elements earth and water in the body thereby accumulating *béken*³²⁵ disproportionately. The heavy nature of mercury would extinguish the digestive heat, thereby slowing down the metabolism and causing hindrances in the synthesis of food and its subsequent benefits for mind and body (Sonam Dolma 2013, 113).

The way to tame *chiba duk* is through cooking and washing techniques, which will make mercury's properties lighter. During this application, the pre-processed eight minerals devour *chiba duk*. In the end, the processed *tsotel* substance will swim on the surface of a glass of water (see photo in Dawa Ridrak 2003, 427). If it sinks, the processing steps have to be repeated until the heaviness has been transformed into lightness, and the mercury refinement has been accomplished, *ngülchu drup* (see Chapter 2).

MOBILE, PENETRATIVE, AND PIERCING POISONS

Elemental mercury is very mobile, rolling across surfaces in the form of globules; thus its association with the fitting name "poison of mobility," or *yoba duk*. This mobility also makes it penetrating. *Bikpé duk* mainly refers to mercury's ability to penetrate the entire body and pierce any tissues it comes in contact with. It means that with this type of *duk*, mercury's toxicity can reach anywhere in the body. In the words of Dr. Dolma:

The "penetrative" or "mobile" characteristics are better understood in lay language as "fast" (*myur ba*) and "unhindered" (*mi gtong ba*). It means that mercury passes through the passages and immediately disseminates into the entire system of the body, making it vulnerable. Due to it being "fast," which also has the connotation of being "sharp" (*rno ba*) in nature, there would be no time to apply any methods against its detrimental effect. The toxic effect of unprocessed

323 The three *nyépa* were introduced in Chapter 2. The basic building modules of potency in Sowa Rigpa *menjor* theory are the eight *nüpa* (heavy, oily, cool, blunt, light, coarse, hot, and sharp), which are intertwined with the six tastes (*ro drug*), and the three postdigestive tastes (*zhu rjes gsum*) of substances.

324 Dr. Dolma received theoretical instructions on making *tsotel*, interpreted for many senior physicians, and until 2013 worked at the Men-Tsee-Khang Translation Department (now called the Documentation and Publication Department).

325 *Béken* is one of the three *nyépa* predominated by earth and water and has the characteristic of heaviness.

mercury is therefore also a time-bound factor, which hinders the physician from counteracting its poison once it has been ingested (Sonam Dolma 2013, 114).

The poisons *chiba duk*, *bikpé duk*, and *yoba duk* are “devoured” by the eight minerals, “bound” by the eight metals, and “tamed” through extensive cooking and washing processes, described below. Eventually, “mercury’s ‘penetrative’ and ‘mobile’ nature, [...] is transformed into a curd-like matter, which can be easily held between one’s fingers” (Sonam Dolma 2013, 116; see also Dawa Ridrak 2003, 424/11, 424/16). When its mobility has been tamed, it becomes “similar to a cleaned mirror” (*me long physis pa ltar*, Dawa Ridrak 2003, 424/11) and can no longer move around unhindered. A so-called safety test involves putting a matchstick into the shiny matter to see if it stands on its own. If it does not, the processing steps have to be repeated.³²⁶

RUSTY AND ADHERENT POISONS

Because of its rusty and sticky nature, *tsi duk* is very similar to *ya duk* (poison of rust/oxide) and requires special processing by washing mercury with various plants and acids. Dr. Dorje Damdul at CHITS explained that *tsi duk* is related to the term *jartsi* (*sbyar rtsi*), which means a glue-like or gummy substance. He explained, “*Tsi* is something sticky, and *jar* refers to something very attached.”³²⁷ *Ya* is like a rust that has to be washed. Dr. Penpa Tsering compared it with the Tibetan cultural practice of cleaning off the *ya* from a copper vessel with fermented barley beer, *chang*. *Chang* is a crucial ingredient in washing off the *ya duk*, not only from mercury but also from the stomach linings of physicians exposed to its toxicity (see last section).³²⁸

Dr. Dawa Ridrak, during our conversation in New York, translated *tsi duk* as a form of oxide, or *ya*:

It is like the oxide from the silver and gold. *Tsi* literally means essence, but here it is an oxide, called *ya*. When you touch silver it will be black; the black stuff has to be removed. Likewise the *ya* has to be removed from mercury.³²⁹

Dr. Sonam Dolma explains *tsi duk* using an allegory that was mentioned by her Men-Tsee-Khang teacher, the late Lobsang Chöpel of Phagri, who participated in making *tsotel* in 1982 (see Fig. 20 in Chapter 3):

326 See a photo of this test in Dawa Ridrak (2003, 424). See also Simioli (2016, 404, note 56), who refers to this test in Sangyé Gyatso’s *Blue Beryl*.

327 Interview, Sarnath, December 21, 2012.

328 Interview, Sidhpur, June 4, 2016.

329 Interview, New York, April 1, 2012.

The “adherent” nature of mercury is explained in the form of a metaphor of oil being absorbed by a cloth. In this metaphor, the body is described as a piece of cloth which, once it comes in contact with the toxicity of unprocessed mercury, cannot be purged from the stain of the oil. Like the oil clinging to the piece of cloth, the “adherent poison” of the mercury stays with the body. The cloth wastes away on trying to wash off the oil stain; similarly the body literally gets tormented and wastes away in the process of cleansing and purging the toxic [unprocessed] mercury (Sonam Dolma 2013, 114).

We can understand from all these quotes that the entire taming process is not about taking something out, but about manipulating existing modalities that are characteristic for poisonous substances into smoother qualities that make a substance beneficial. Safety is articulated in terms of how well the various types of *duk* have been tamed. This also includes a temporal element: the longer the processing—attending to all the steps that have to be carried out accurately—the safer the substance. I alluded to this temporality in Chapter 2, where I explained the meaning of *choga* (practice/procedure) and the importance of agency, skill, and effort in processing mercury. This interrelationship between time spent on *choga* and the accomplished or perfected level, or *drup*, of the tamed final product adds to my argument that perceptions of safety and potency are deeply encapsulated in the human effort and “enskilment” of processing, to use Ingold’s fitting term (Ingold 2000). Moreover, Sowa Rigpa *menjor* taming processes are also metaphorically linked to the skills of Buddhist mind training. Dawa Ridrak expresses this elegantly:

For example: *chang* [Tibetan roasted barley beer], garlic, meat, and butter have a smooth quality; they tame the adherent poison of mercury, which has the characteristic of roughness. Metaphorically speaking, it is like love conquering hatred.³³⁰

In the following, I specifically explore the nature of *choga* in the main processing steps for making *tsotel*, beginning with a myth that symbolically describes the main ingredients and steps involved in the process.

THE MYTH OF THE EIGHT SAGES AND THE QUEEN OF POISON

Following Tibetan literary tradition, Dawa Ridrak places this myth at the beginning of his *tsotel* chapter.³³¹ It briefly describes the active agents involved in mercury processing, personifying key substances as a queen,

330 Translated from Dawa Ridrak (2003, 420/11–13): [...] *dper na/ chang sgog sha mar gyi yon tan 'jam pas/ dngul chu'i mtshan nyid rtsub pa'am rtsi'i dug 'joms te/ dper na byams pas zhe sdang 'joms pa lta bu dang /*.

331 The myth is also found in Degé Drungyig Gurupel (1986, 306/5–307/3) and Lamenna Orgyen Tendzin Gyatso (1986, 185/6–187/1).

serpents, and sages. This symbolism is understood as a tool to transfer knowledge more securely. Without the explanations of teachers, the myth does not make much sense. Most physicians could not explain it to me. It required experts who had made *tsotel* and had studied the texts to decipher the symbolism. Here I summarize the myth and add explanations and key Tibetan terms in parenthesis.³³²

Among the inanimate poisons [created during the churning of the ocean] the main [poison] was mercury, which was eaten by the eight serpents [*klu brygad*], who then died [of the poison]. The corpses [of the eight serpents] turned into the eight devourers [*za byed brygad*, which are flesh-eating demons, in this case the eight minerals—orpiment, realgar, magnetite, etc.—that devour mercury]; the queen of poison [the necessary, but disquieting, female principle] instigated trouble inside by mixing roasted barley beer [*chang*] and urine [*dri chu*] into the poison, which became intoxicated. [This refers to the nature of mercury being rough and mobile, and its strong reaction when exposed to the acid substances used to refine it], at which time, the eight sages [*drang srong brygad*, resembling the eight metals] bound [mercury] and burned it.

Negativities [*sdig pa*, i.e. the various types of *duk*] were washed and cooked, and the purified [*sbyang*, referring to mercury] turned into nectar. And due to the power of prayers the queen [of poison turned into] sulfur [*mu zi*], the beer into the three sour ones [*skiyur gsum*, which are sour *chang*, yellow and black types of soil, and *tarbu* juice, needed during the mercury cooking process], the urine into *tsurchu* [*mtshur chu*, which refers to *ser mtshur* or *nag mtshur*, which are types of soil], and the eight sages [transformed into] the eight binding metals [*ching byed lcags brygad*—gold, silver, copper, etc.], and the eight serpents [transformed] into the eight devourers [*za byed brygad*, which are the eight minerals]. The fire that burned [mercury] transformed into the three hot ones [*tsha ba gsum*, which are ginger (*lga skya*), long pepper (*pi pi ling*), and black pepper (*pho ba ris*) needed during the first stage of processing]. The fire itself transformed into all realities. Due to the power of interdependence [*rten 'brel gyi mthu*], the practice went well. [...] This is the legend regarding mercury preparations, and there are many short and extensive treatises and processing practices extant until this day.³³³

332 Special thanks to Dr. Tenzin Thaye and Dr. Dawa Ridrak for explaining this myth to me.

333 Translated from Dawa Ridrak (2003, 402 / 24–403 / 4): [...] *mi rgyu ba'i dug gi gtso bo dngul chu klu brygad kyis zas pa'i shi ba'i ro za byed brygad yin la dug gi btsun mos nang dbyen byas nas dug la chang dang dri chu sbyin pas myos pa'i tsho drang srong brygad kyis bkyig nas mes bsregs/ sdig pa bkru shing btsos te sbyang pas bdud rtsir 'gyur/ de nas smon lam dbang gi btsun mo ni mu zi/ skiyur gsum ni chang dang dri chu mtshur chu bcas dang / drang srong brygad ni 'ching byed lcags brygad/ klu brygad ni za byed brygad/ bsreg byed me ni tsha ba gsum dang*

The myth reveals that the main ingredients used during the *tsotel* practice are catalyzed and undergo a transformation themselves before they can be used to tame mercury. Thus, not only mercury and sulfur are pre-processed, but many of the other ingredients, especially the eight minerals and eight metals; each undergo extensive pre-processing as well, contributing to the complex, time-consuming, and challenging *tsodru chenmo* event.

Most modern Tibetan texts divide the *tsodru chenmo* technique, which can take up to forty days or more to complete, into four main processing phases³³⁴: (1) to “remove the rust/oxide,” *ya chipa (g.ya’ physis pa)*; (2) to “expel the rust/oxide liquid,” *ya khu dönpa (g.ya’ khu ’don pa)*; (3) to “tame the heavy and penetrative poisons of mercury through cooking and washing” (*dngul chu lci ’bigs btso bkrus ’dul ba*; Dawa Ridrak 2003, 420/21), briefly called “cooking, washing” or *tsodru (btso bkrus)*; and (4) to “transform the natural form [of mercury through] confrontation” (*dgra dang sprad nas rang gzugs [su] bsgyur ba*; 2003, 424/27), briefly known as “meeting the enemy” or *dratré*. These four processing phases are often succinctly presented as the three main steps of cleansing, cooking, and confrontation (Sonam Dolma 2013, 116).

Several modern works published by Tibetan medical practitioners in the PRC describe these processing methods in great detail (e.g. Troru Tsénam 2001, vol. 4, 510–625, 2012; Tsoga Jikjé Tséring 2003; Tsüntargyel 2007), and some are illustrated with photos (e.g. Nyima Tséring 2009; Sönam Bakdrö 2006). They are all ultimately based on the famous *tsotel* manuals by eastern Tibetan authors discussed in Chapter 4. Dawa Ridrak’s account (2003, 412/18–451/18) documents making *tsotel* at the Men-Tsee-Khang in 1994 and is based on Kongtrul Yönten Gyatso’s work.³³⁵

In respect for what is considered a secret practice, in the following I will only describe some of the principle characteristics of taming. Physicians perceive these characteristics directly through their senses, which I argue also determines how they think of mercury’s toxicity and safety. Some of the processing techniques also have a strong resemblance to Tibetan ways of preparing food, thus revealing culture-specific enskilments, probably developed over time with tools that were available in Tibet. It would be a worthwhile study, which is beyond the scope of this book, to compare the Tibetan techniques with the *saṃskāras* in Indian alchemy (e.g. Murthy 2008; White 1996, 265–269).³³⁶

The four principle phases of taming mercury into *tsotel* are:

me dngos rnams su ’gyur/ rten ’brel gyi mthu las lag len ’di ’byung ba’i [...] / ces pa’i gtam rgyud dang ’brel ba’i dngul chu’i sbyor ba rgyas bsdus shin tu mang ba’i bstan bcos dang lag len gyi sbyor tshul da lta’i bar yod [...].

334 Here they are summarized from Dawa Ridrak (2003, 414/13–428/25) and Penpa Tsering (1997, 29/3–32/9).

335 Interview, New York, April 1, 2012.

336 Simioli (2015, 43) argues that the processing steps in the two alchemical texts from the Tibetan Buddhist Canon authored by Bhalipa “basically conform to the eighteenth canonical *saṃskāras* or alchemical operations of Indian alchemy.”

(1) Removing the rust / oxide, *ya chipa*

In order to remove the *ya*, liquid mercury is kneaded over the course of several days with the “three hot ones” (ginger, black pepper, and long pepper) in a sealed animal-skin bag placed in a large round iron pan. Mantras are recited during kneading. The technique resembles a Tibetan custom of kneading roasted barley flour, or *tsampa* (*tsam pa*), in an animal skin bag (today made of goat’s skin) that was also used in Tibet to transport *tsampa* while traveling. The mercury is frequently washed in a special water solution and the liquid is replaced. After this processing phase, mercury is considered free from any possible impurities. This also includes the contaminants found in adulterated, commercially-bought liquid mercury (e.g. lead), of which Tibetan physicians in India are cognizant.

(2) Expelling the rust / oxide liquid, *ya khu dönpa*

During this phase, mercury is churned with a variety of acids (such as urine, sour seabuckthorn berry juice, or *tarbu*), many different types of salt, and other substances in a metal container with a large churning stick. The equipment and technique resemble the Tibetan method of churning butter or making butter tea (see photo in Dawa Ridrak 2003, 416). The churning is followed by frequent washing and rinsing, as well as expelling the liquid that contains the *ya*. This cycle goes on for many days with mantra recitations. Foods perceived to have the quality of smoothness while also having the ability to tame the roughness of mercury, such as fermented barley beer, garlic, meat, and butter—all part of the staple Tibetan diet—are used in this process (Dawa Ridrak 2003, 420/11). At the end of this step, the aforementioned matchstick test is performed and provides visible evidence of whether the processing was successful. If the stick does not stand up, they must repeat the same procedure the next day. Dr. Tenzin Thaye described this test as a form of safety, as well as standardization, noting, “Each step of taming has its challenges, so the tests show if the taming has been successful.”³³⁷

(3) Cooking and washing, *tsodru*

The *tsodru* phase has three parts—the greater, middle, and lesser. This phase involves cooking the mercury in a caldron (see Fig. 19, Chapter 3) with a number of ingredients, including the pre-processed powder of the eight minerals and the pre-processed ashes of the eight metals. This cooking occurs in three stages at varying temperatures: first for ninety-six hours (greater), then forty-eight hours (middle), and finally for twenty-four hours (lesser). Phases of cooking are always followed by phases of washing the mercury with various types of ingredients dissolved in water.

337 Personal communication, McLeod Ganj, December 7, 2012.

(4) Meeting the enemy, *dratré*

This processing phase takes place in a darkened, clean, and quiet room and involves the trituration of the processed mercury with pre-processed sulfur on a pre-heated stone trough, *do zhong*, for several days. It is considered the most important phase, which women are prohibited from attending. It is technically challenging and therefore accompanied by special rituals.³³⁸ Tenzin Thaye, who made *tsotel* at the Men-Tsee-Khang in 2001, 2008, and 2014, explained:

On that day, we always invite a lama to begin the trituration. It is difficult and does not always go smoothly, even if you do everything right physically. So we always invite a rinpoche. First, we recite prayers and perform rituals, then the lama will start mixing the sulfur with mercury. After he mixes it for thirty to sixty minutes we distribute a little of the mixture to all the troughs of the other workers. If we give this as a *jinalap* (forms of blessing) to all, it will go well!³³⁹

Dawa Ridrak, who took part in making *tsotel* at the Men-Tsee-Khang in 1994 and published a daily account of the event, describes this day of “meeting the enemy” as follows:

Day 27: [...] Relying on the hour harmonious to making nectar,³⁴⁰ again three physicians for the sake of removing obstacles make a smoke offering and a drink offering to the oath-bound protectors and perform elaborate libation offerings.

Then, inside, the doctors jointly [perform] the seven-fold ritual and chant in unison the Guru Yoga of Avalokiteśvara, then have tea, food, and fruits together, offer it to a high-standing person, and establish a boundary [*grub mtshams*]. Prepare the stone troughs, the round [grinding] stones, and heat up the charcoal fire. At the beginning, Toding Rinpoche³⁴¹ inaugurates [the event] and bestows the preliminary practice of the self-generation of the Kālacakra [his own tutelary deity practice]. When the two, the queen, refined essence of the earth *chülen* [which is sulfur] and the male deity's essence *daryaken* [*dar ya kan*, which refers to mercury], are put together, [they] turn into a blue-black color.³⁴²

338 See, for example, Chapter 3 on the Dalai Lama initiating this trituration in 1982.

339 Interview, Dharamsala, May 15, 2015.

340 This is an astrologically calculated auspicious conjunction of a favorable time to make good (nectar) medicines.

341 Toding Rinpoche (Tupten Gyeltsen) was a young monk and assistant during the 1982 *tsotel* event (see Fig. 22, Chapter 3) and later became a physician at the Men-Tsee-Khang and participated in the *tsotel* events of 1994 and 2001.

342 Translated from Dawa Ridrak (2003, 425/4–18): *nyin nyi shu rtsa bdun/ [...] dus tshod bdud rtsi thun mtshams la brten nas sman pa gsum gyis yang thog tu bgegs sel ched bsangs dang gser skyems dam can gsol kha gzab rgyas byas/ de nas nang*

Note that these rituals are not meant to tame mercury but to protect those who tame it and to remove any types of obstacles, *barché*. Here, the smoke and drink offerings in combination with individual deity practices ritually protect the pharmacy space in which the transformation of mercury takes place. The so-called seven-fold ritual is a set of seven or more rituals and a common component of Mahāyāna Buddhist liturgy often performed at the beginning of major ritual practices to accumulate merit (Buswell and Lopez 2014, 776). The ritual sealing of the pharmacy space establishes a boundary that can only be entered by those closely involved with the entire processing. It allows for a concentrated, undisturbed, and ritually protected workspace (see Fig. 42 below for rituals conducted on another day of processing).

The transformation of mercury and sulfur during their “confrontation,” *dratré*, is striking, since the light-colored powder turns into a blue-black paste and then into a blackish powder through thorough and repeated trituration. Dr. Choelothar described this transformation: “When *muzi* [sulfur] meets mercury it is like an atom bomb. After *dratré* there is no mobility of mercury left. It has turned into a black powder and cannot move.”³⁴³ The final test of successful processing is when the *tsotel* powder swims on the surface of a water glass, as explained above.

Dr. Tenzin Thaye summarized his experience of taming mercury, also drawing a parallel to taming negativities in one’s mind (see Introduction):

You cannot tame the mind instantly, it takes time to tame negativities. Likewise, taming mercury takes many steps. Taming takes time. According to the character of a person he does good or bad things. Mercury has a bad character: it is raw, heavy, rough, and sharp, that is why we say it has a lot of *duk*. To change all these characters takes time, they have to be tamed and transformed into smooth and light, etc. These procedures take time. I never understood why one step follows the other, but when you actually see it, it makes sense. In each step, we see a lot of change in the nature of mercury, so each step is very important.³⁴⁴

Maybe now we can envision why this part of the processing is called a confrontation. In practice, it deeply affects the character of the mercury substance, rendering it immovable. In the subjugation myth of Buddhist tantrism, the demon Rudra (representing Śiva, whose semen resembles

du sman las thun mong nas yan lag bdun pa'i cho ga dang spyen ras gzigs bla ma'i rnal 'byor 'ur 'don dang gsol ja gro 'bras dang bcas pa 'degs 'bul grub mtshams rdo gzhong dang / rdo ril/ sol me tsha po bcos/ thog mar mtho lding rin po che nas dbu 'byed kyi tshul du dus 'khor gyi bdag bskyed bsodus pa sngon 'gro gngang zhing / sa bcud kyi dwangs ma btsun mo dang yab kyi dwangs ma dar ya kan gnyis phan tshun sprad nas mdog mthing nag can du 'gyur bas/.

343 Personal communication, Chontra, May 6, 2016.

344 Personal communication, McLeod Ganj, December 7, 2014.

mercury) was confronted quite violently, killed, and resurrected as a protector of Buddhism (Mayer 1996, 104–128). These elements of demon subjugation reverberate deeply in the *tsodru chenmo* steps of processing.

Mercury is confronted by many powerful substances in long acts of rubbing, churning, and boiling, until its total transformation into an immobile powder that can neither harm, nor revert to its previous negative rough state. The power of the poison is not lost, but tamed in order to be utilized as a potent medicine. The final step of “meeting the enemy” subdues a powerful poison, evoking one of the most enigmatic images in Tibetan culture: the pinning down of demons into Tibetan landscapes and transforming them into powerful sacred places (Gyatso 1987) and protectors of Buddhism. Likewise, the control of mercury happens alongside imbuing it with power and potency; thus amchi consider *tsotel* the best elixir to treat the most difficult diseases and protect health.

The scientists who conducted the *tsotel* study at the Men-Tsee-Khang considered all mercury compounds in their samples (whether *chokla*, *kardül*, *tsadül*, or *tsotel*) as mercury sulfide, which they thought to be safer than any of the other chemical forms of mercury because of its insolubility (see Appendix A). For Tibetan physicians, taming mercury is much more than merely mixing mercury with sulfur: taming the poisonous requires a deeper skilled and sensory engagement with the changing modalities of mercury. From their perspective, during the long and arduous process, heaviness becomes light, roughness becomes smooth, and mobility becomes immobile. The different epistemologies of Sowa Rigpa and modern chemistry do not easily find a meeting ground here,³⁴⁵ and a simple comparison could easily lead to a binary conclusion that Tibetans merely figured out how to create a safer form of mercury by adding sulfur. However, that would be missing the point of the Tibetan understanding of the entire endeavor of taming and ignore the ways *tsotel*'s therapeutic applications and potency is perceived and understood (see Chapter 7).

The chief physician who oversees and guides the taming of mercury also takes the main responsibility for its safety. After each successful processing of *tsotel*, he consumes about three grams of *tsotel* (considered quite a substantial dose) in front of his colleagues or in a public function to show that he is confident that the taming was successful and that the substance is no longer poisonous (Fig. 41).

While *tsotel* is considered safe, the physicians and workers conducting the processing are aware of their exposure to toxic mercury fumes and have developed several techniques to deal with it. How do they make sense of different notions of risk and mercury toxicity symptoms, prompting different kinds of protection?

345 For promising approaches to prepare the terminology for such a meeting ground see Tidwell and Nettles (2019).



Figure 41: Dr. Jamyang Tashi, head of the Pharmacy Department at the Men-Tsee-Khang, publicly takes three grams of *tsotel* during a ceremony to show that he is confident that the taming process was successful and that the substance is no longer poisonous. Here, the ceremony was part of the golden jubilee fifty years of Men-Tsee-Khang celebrations in 2011.

Photo: Men-Tsee-Khang (Men-Tsee-Khang 2011 / CC-BY-SA 4.0).

Occupational safety

Tibetan physicians know that mercury can be highly poisonous and take precautionary measures when handling it. Sowa Rigpa texts are full of warnings of the potential dangers, which are twofold: firstly during processing and secondly when medicines containing processed mercury are wrongly administered.³⁴⁶ Here I discuss the first, based on interviews with Tibetan physicians.

During *tsodru chenmo*, everybody involved drinks a lot of *chang*, except monastics who took vows not to drink alcohol. I was given different reasons for this. Some doctors explained that the warm fermented Tibetan barley beer is nutritious and reduces *lung* (one of the three *nyépa*), thus making the body less affected by *duk*. This follows the *Four Treatises*, which explains that the appropriate antidote to treat deliberate mercury poisoning is the ingestion of warming foods. This is linked to the Sowa Rigpa theory that a strong digestive heat or *médrö* can better digest *duk*. The Tibetan

346 Some countermeasures of treating post-therapeutic complications of poisoning (*log gnon*), caused by the wrong manufacturing or erroneous administration of precious medicines are discussed in Chapter 11 of the Last Tantra in the *Four Treatises* (MTK 2015, 134–135; see also Gerke and Ploberger 2017a).

physician Dr. Yeshe Gelek, who made *tsotel* in Lhokha in southern Tibet in 1991 and later taught at the Men-Tsee-Khang college in Dharamsala, explained:

Drinking *chang* reduces *lung*. People who have better strength have less effect of poisoning. People who have more *lung* have a stronger tendency to get poisoning. Normally, compounded poisoning [*sbayar dug*] is bound through something warm.³⁴⁷

Dr. Penpa Tsering, who made *tsotel* in 1987 at the Men-Tsee-Khang, gave a further reason:

The poison of *ya* of mercury will stick to our stomach. We normally clean the *ya* of copper vessels with *chang*. The method is the same: if we drink a lot of *chang* it will wash away the *ya* from the stomach.³⁴⁸

Dr. Tenzin Thaye explained:

Chang has its own potency. We use it against wound infections. It is mentioned in the *Four Treatises*, in the chapter on treating wounds. It in itself cleans the poison. And also the poison cannot harm you if you take *chang*, it does more than strengthening the body against poison, it can clear it; we call it *duksel [dug sel]*.³⁴⁹

Taking alcohol while processing mercury is an example of how long-term experiential knowledge might correspond to recent scientific findings. It has been known since the 1960s that ethanol inhibits the oxidation of mercury vapor (Clarkson and Magos 2006, 618; Martin and Naleway 2004). However, not taking alcohol is one of the vows to which most Buddhist monks and nuns adhere. This causes additional challenges for ordained amchi making *tsotel*, prompting them to look for different types of protection. "Doctors processing mercury should take a lot of *chang*, those who don't, like monks, take lemon, and some sour things," explained Dr. Dawa Dolma, who headed the Men-Tsee-Khang Research and Development Department during the first *tsotel* study.³⁵⁰ Dr. Tenzin Thaye is a monk and because of his Buddhist precepts would not drink *chang*. He was very concerned about his safety and asked his lama for permission to drink *chang* should he feel uneasy from the exposure to different forms of mercury. In addition, he made his own eye goggles using a pair of glasses adding special tape, used a mask, and ingested a lot of sour lemon juice. He did not experience any adverse effects.

347 Personal communication, Dharamsala, October 30, 2012.

348 Interview, Sidhpur, June 4, 2016.

349 Personal communication, June 6, 2016.

350 Personal communication, McLeod Ganj, August 25, 2010.

However, some physicians who processed mercury did experience adverse health effects. They described painful gums lasting for a few days. Some experienced diarrhea, and in the worst cases when they were not careful with the fumes, temporary blurred vision. These symptoms were reported largely by monks, who could not drink *chang*. Dr. Yeshe Gelek, who was a monk at the time when he made *tsotel* in Lhokha in 1991 and did not drink *chang*, experienced temporary blurred vision during the boiling of mercury, a symptom frequently reported during occupational mercury exposure (Cavalleri and Gobba 1998). His colleagues, who drank *chang*, did not experience any blurred vision.³⁵¹

Namgyal Tsering writes, "If possible, one must keep a piece of raw goat meat in the mouth; that meat absorbs all the poisons. In the evening when finishing work, you must throw the meat away."³⁵² As far as I could find out, at the Men-Tsee-Khang this is not put into practice anymore, but those making *tsotel* receive a very nutritious and warm diet to keep their *méd-rö* (digestive heat) strong. According to Sowa Rigpa theory, any type of *duk* weakens the *méd-rö*.

Contemporary Tibetan medical texts warn about the effects of the consumption of wrongly processed mercury or exposure to its fumes. As Penpa Tsering writes:

In severe cases, it can take someone's life. Small exposure can diminish physical strength, it can cause severe discomfort, weaken the digestive heat of the stomach, produce a certain type of an advanced edema condition [*dmu chu*], and [types of] tumors [*skran nad*], it can turn the body very skinny and blue in color, loosen up gums and make teeth fall out. It can cause obscure visions and so forth, and lead to many detriments.³⁵³

Overall, I found that those physicians who consumed a large amount of *chang* and whisky did not experience any direct effects of mercury toxicity. However, those not used to drinking alcohol seem to be more at risk. Those physicians experiencing adverse effects did not doubt the success of the actual taming process, but wanted to employ new techniques to keep themselves safe. One physician who made *tsotel* in the past and could not drink much *chang* told me in a private conversation:

351 Interview, Dharamsala, October 30.10.2012.

352 Translated from Namgyal Tsering (1997, 13/8–9): *byung na ra sha rlon pa kha nang nyar la sha des dug len pas phyi dro las mtshams 'jog skabs 'dor bar bya/*.

353 Translated from Penpa Tsering (1997, 27/6–9): *che sar 'gro ba'i srog 'dor zhing / chung sar lus kyi stobs 'bri ba dang / zug rngu drag po 'byung ba/ pho ba'i me drod nyams pa/ dmu chu dang skran gyi nad skyed pa/ lus kyi mdog sngo zhing skem par byed pa/ rnyil chad cing so bud pa/ mig 'grib pa sogs kyi nyes pa du ma 'byung ba 'gyur/*.

- AMCHI: *While working, it is very poisonous. It will affect the digestion. We cannot eat much, even though we get very good food, but we don't feel like eating. We have stomach pain and pain in the gums, and we do not have much appetite.*
- BARBARA GERKE: *Do you think something could be done?*
- AMCHI: *Early on, we thought a lot about it. Ngülchu poison comes mainly from its fumes. We thought of getting some oxygen masks and oxygen cylinders to breathe clean air while processing. Then there would be no direct contact with ngülchu fumes. We were not able to get it. If all workers could wear it, it would protect us. After making tsotel, when I watched TV for an hour or read a book, my eyes got red. After many years my symptoms slowly decreased. In our texts it says ngülchu is the "king of poison"; after detoxification, it is the "king of medicine," but for workers it can be problematic.*
- BARBARA GERKE: *Now there is the technology to protect workers from fumes.*
- AMCHI: *It would be very important to use modern technology. The ya khu dön could be done with a machine. We bind the stick with robes and have one worker stir it all day long inside the metal container. Now you could do it electrically. In Indian pharmacies they also do it with electricity now; it means less exposure to mercury. We should do research and apply new technologies.*
- BARBARA GERKE: *But many doctors say they cannot change their tradition.*
- AMCHI: *Methods are changing all around the world. In ancient times people always walked, now they take a plane or car. They don't say you have to walk. It is the same thing. We can modernise. The main thing is we should know the techniques.*

Amchi know that they are exposed to mercury fumes in the beginning of the process, especially during the boiling phases. The liquids that mercury is washed in have to be disposed of in safe places, and the processing should take place in a remote and quiet area, preferably in the open. Dr. Tashi Yangphel Tashigang told me in Delhi: "We have to purify mercury outside, where there is wind to take the fumes away."³⁵⁴ A Ladakhi amchi told me that when Trogawa Rinpoche made *tsotel* in Ladakh (see Chapter 3), the participating physicians, apart from taking *chang* and keeping a piece of raw meat in their mouths, applied a special ointment made by Trogawa Rinpoche, called *kamadeva*, to any skin exposed to fumes.³⁵⁵ Dr. Ngawang Thinle, Trogawa Rinpoche's student during the 1990s, remembered that they also used this ointment while making *kardül* at Chagpori Tibetan

354 Interview, Delhi, August 25, 2012.

355 Personal communication during the Kathmandu workshop, December 2011.

Medical Institute in Darjeeling. It was made from oil and a reddish type of plant. It “looked like rouge” and made them joke with each other. They also closed their nostrils with cotton soaked in nutmeg (*dza ti*), which was known to protect the channels.³⁵⁶ These examples show that Tibetan physicians have thought about issues of risk and exposure to mercury toxicity and have applied their traditional knowledge and their own expertise to protect themselves. Occupational risk protection, such as the use of gloves and masks, varies depending on availability and who is supervising the processing event. For instance, Dr. Tenzin Thaye said that during the boiling process they are supposed to wear eye-goggles and masks because of the fumes and the tremendous smell.

This photograph (Fig. 42) of the sixth *tsotel* event at the Men-Tsee-Khang in Dharamsala in 2011 shows several methods of risk management during the taming process. First, risk is managed ritually: the four monks in the background perform protector rituals to dispel obstacles from the taming process. The Men-Tsee-Khang resident monk (*sku snyer*, second from left), who carries out these protector rituals daily at the institute’s official shrine room, is performing them inside the pharmacy during the making of *tsotel*.³⁵⁷

Second, physicians and their assistants keep the level of water above the mercury mixture to reduce potential evaporation during the washing process. However, we see that only some workers wore masks, and all worked with bare hands. When I asked why they did not use gloves, Dr. Jamyang Tashi, who supervised the event, responded that the gloves were not good quality and might be affected by the processing and they did not want any rubber to enter the medicine.³⁵⁸ Dr. Tenzin Thaye explained that especially towards the end, when mercury is processed, they touch it with their hands:

First mercury is liquid and will flow off our hands. After the first step, it will stick to the hands and is less mobile. After cooking and mixing it with sulfur, all types of *duk* are gone and it has no poison, so we touch it and mix it with our hands. We could use gloves, but we feel uncomfortable wearing plastic all day long. We are certain that mercury at this stage of the taming process is not poisonous, so we prefer to use our bare hands.³⁵⁹

Physicians experience mercury’s transformation across the stages of processing through direct sensory engagement with the element, which changes its consistency from one step to the next; these changes can be felt and seen. The more mercury is tamed, the less poisonous it appears to those processing it. We have seen that this translates into various

356 Ngawang Thinle, personal communication, Kathmandu, December 20, 2011.

357 Tenzin Thaye, personal communication, McLeod Ganj, December 7, 2014.

358 Personal communication, Dharamsala, May 14, 2015.

359 Personal communication, McLeod Ganj, December 7, 2014.



Figure 42: Washing pre-processed mercury during the making of *tsotel* at the Men-Tsee-Khang in 2011. The water that carries the *ya* is absorbed with cotton and removed. The monks in the background perform protector rituals to dispel obstacles from the taming process. The caldron used to boil mercury can be seen in the back to the right. Photo: Men-Tsee-Khang (Men-Tsee-Khang 2011 / CC-BY-SA 4.0).

protective measures. Decisions on whether to wear gloves or not are also based on personal comfort and experience of practical hands-on mixing methods.

Overall, the physicians making *tsotel* know that they are taming a potentially dangerous substance. In the words of Dr. Namgyal Tsering, who wrote a brief account on *tsotel*:

Nowadays mercury is considered hazardous, which is very true. If one does not know the art of taming *ngülchu* well and does it with doubts, then there is definitely no benefit and it is not only very harmful but can also endanger life. Therefore, one must be careful and attentive [during processing]; this is very important.³⁶⁰

The ethnographic examples reveal varying views on the safety of processed or tamed mercury among Tibetan practitioners themselves, which

360 Translated from Namgyal Tsering (1997, 12/1–4): *deng 'dzam gling 'di na dngul chu zhes pa nyen tshabs cher brtsi ba bden mod/ dngul chu 'dul thabs ma shes par 'ol tshod byas na phan pa med pa lta cig nod che zhing srog kyang rgol bas phyi 'byung 'di la rig pa gzab dgos pa gal cher som/*.

defy a single answer to the complex question of how Tibetans have been handling mercury. While they all have in common a deep respect for mercury's poisonousness, power, and potency, they handle it very differently, depending on their backgrounds, training, and beliefs.

By and large, I found that amchi handle mercury very cautiously. They respect its poison, admire its potency, and are generally aware of its toxic fumes, but my impression was that in India they are largely unaware of its long-term cumulative effects from low exposure. Despite individual experiences of short-term symptoms of mercury poisoning, institutional changes such as installing fume hoods and wearing specialized mercury masks are still awaited.

More recently, some institutes have introduced safety measures. When I visited the Ayurveda Rasa Shastra Department at BHU in Varanasi in 2015, a fume hood was just being installed to collect the mercury fumes that were previously directed into the environment through an open window and could easily be considered environmental pollution or an occupational risk during an official inspection. This decision coincided with their application to the ministry of AYUSH for an exemption of Ayurvedic medicines from the UNEP mercury ban.

When I mentioned the fume hood to Dr. Jamyang Tashi, head of the Pharmacy Department at the Men-Tsee-Khang, a few weeks later, his first reaction was, "But we cannot change our traditional methods of making *tsotel*."³⁶¹ It took some time and translations into Tibetan by a younger Tibetan physician with a science background to explain that traditional processing methods could continue, but that a fume hood, used during certain stages of the processing, would protect not only the workers from mercury fumes but also the environment. I also mentioned mercury fume protection masks. A year later, after the Second International Conference on Tibetan Medicine at the Men-Tsee-Khang (see Chapter 7), during which mercury was a key theme, I mentioned these safety options again, this time to the Men-Tsee-Khang director as well as to the conference organizer and head of the Research and Development Department, Dr. Rigzin Sangmo.³⁶² With a science background and her involvement in the two toxicity studies, Dr. Rigzin Sangmo understood the significance and supported the application of such precautions, referring to them as modernized traditional Tibetan medicine, in which the environment and workers' health would be protected without giving up traditional processing techniques. We continued to discuss these issues over the years and it seems that, as of completing this book, there have been detailed discussions at the Men-Tsee-Khang on implementing some of these safety measures, specifically fume hoods, mercury fume protection masks, and the collection and safe storage of mercury residues accumulated during processing.

361 Personal communication, Dharamsala, May 14, 2015.

362 Personal communication, Dharamsala, April 29, 2016.

Changing risk and safety assessments

In summary, we have seen how Buddhist ideas of taming affect Tibetan medical sensibilities regarding the safety of tamed poisons. Once a poisonous substance is fully “tamed” it is considered “safe,” similar to a subjugated demon who has been tamed to safeguard Buddhism. Safety proofs in contemporary Sowa Rigpa are also proofs of trust; as we have seen in this chapter with Dr. Jamyang Tashi consuming three grams of *tsotel* publicly in 2011 to take responsibility for the successful taming, these also demonstrate authority and the continuation of lineage.

I conclude from the material presented here that religious and cosmological ideas are fundamentally important to medical perceptions of safety, especially when religious and medical domains have coexisted and interacted with each other in societies over long periods of time. However, the example of the processing of roasted *chokla* for pill coating, and the perceived risks Tibetan physicians associate with its use, shows different and more pragmatic safety assessments. Similar to Cordner’s strategic science translation (Cordner 2015b, 2016), which depends on how toxic risks are interpreted and communicated by different stakeholders, among Sowa Rigpa practitioners the risk assessment of using *chokla* has been influenced by several issues: (1) the risk of mercury-containing medicines being confiscated and analyzed for heavy metals at international borders; (2) the rising price of cinnabar on the Indian market, making it uneconomical to coat pills with *chokla*; (3) the lack of studies that would prove *chokla* to be either useful or harmful; (4) individual physicians’ somatic experiences of discomfort while processing *chokla*, which are assessed in contrast to the observed therapeutic benefits Tibetan physicians see in their patients taking medicines with processed *chokla*.

Toxicity concerns and how they are articulated by different stakeholders form part of the pharmaceutical nexus that is embedded in socially constructed risk assessments. The material presented above shows that changes in ideas of risk assessment could in fact change a medical practice, or even lead to its discontinuance. Several Sowa Rigpa manufacturers in India, including the Men-Tsee-Khang, have stopped the use of *chokla* for the red-color coating of certain pills, and several private pharmacies, which also export medicines, do not use mercury-based substances at all.

Tsotel holds a very different position than *chokla* and is valued as both the pinnacle of Sowa Rigpa *menjor* and a sacred practice, having been transmitted from Vajrayoginī to Orgyen Rinchenpel and through authoritative lineages to this day. We have seen that making *tsotel* is a lot more complex than making *chokla*, and that *tsotel*’s underlying rationale of safe taming has a tantric aspect to it. Will changes in the risk and safety assessments of *tsotel*’s sourcing and manufacturing lead to the discontinuation of its practices? With mercury safety debates gone global, local practices of mercury-containing medicines in Asia are forced to respond to the scrutiny, metrics, and rationale of international and state governing bodies.

How the Tibetan medical community in exile became a player in this field, how they carried out and presented the two mercury toxicity studies (Sallon et al. 2006, 2017) at the Men-Tsee-Khang, and what role they gave to science and the impending UNEP mercury ban—is explored in the next chapter.