Lyophilisation of Traditional Chinese Medicine decoctions

1. Introduction

Traditional Chinese Medicines (TCM) are usually prepared by mashing and boiling in water. This process is called decoction. Thereby, health beneficial compounds are extracted from herbal and plant material. If not directly administered, these extracts can be preserved for a longer shelf life using lyophilisation.

In this Short Note we highlight the lyophilisation procedure of Tianma Gouteng Yin (TGY), as a TCM model decoction. TGY is a widely used medicine applied to treat Parkinson’s disease (PD) like symptoms. Recently, it has been reported that this TCM decoction exerts neuroprotective effects in animal and cell models of PD.1

2. Experimental

Equipment:
- BUCHI Lyovaport™ L-200 Pro
- BUCHI Lyovaport™ Software
- Deep Freezer -24°C, Bauknecht
- Stainless steel tray
- BUCHI Rotavapor® R-300, System Rotavapor® Dynamic

Sample:
- The TGY mixture was prepared by St. Peter Apotheke Zurich, Switzerland.

A human dose of TGY1 contains Gastrodiae Rhizoma (Tianma) 9 g, Uncaria Ramulus Cum Uncis (Gouteng) 12 g, Haliotidis Concha (Shijueming) 18 g, Gardeniae Fructus (Zhizi) 9 g, Scutellariae Radix (Huangqin) 9 g, Cyathulae Radix (Chuanxiong) 12 g, Eucommiae Cortex (Duzhong) 9 g, Leonuri Herba (Yimucao) 9 g, Taxilli Herba (Sangjisheng) 9 g, Polygoni Multiflori Caulis (Shouwuteng) 9 g, Poria (Fuling) 9 g.

A the dose of TGY was steeped for 30 min in threefold tap water (v/w) and then boiled for 60 min on a hot plate.

The brownish extract was filtered and concentrated to less than 50 % of its original volume using a Rotavapor®. The heating bath of the Rotavapor® was set to 60 °C, such that sensitive compounds are protected from overheating at the end of the concentration process.

The concentrated extract was filled in a stainless steel tray and frozen overnight in a deep freezer at -24 °C.

For primary drying, the vacuum was set to 0.105 mbar for 24 h. The secondary drying was performed at 0.100 mbar for 2 h and second step in secondary drying at 0.050 mbar. The shelf temperature was elevated to 25 °C for the secondary drying.

3. Results

The TGY sample was extracted, concentrated and freeze-dried. In the upper part of Figure 1, the sample is shown during the lyophilisation process. In the lower part of Figure 1, the freeze dried product, in a stainless steel tray, is shown.

It is well visible that the product has a highly porous structure. Thanks to this structure as prepared, TCM doses are easily rehydrated and instantly dissolved. It can be consumed directly or after rehydration. The health beneficial compounds are preserved during lyophilisation.1

Furthermore, as prepared TCM decoctions have a long shelf life in a vacuum- or vacuum-nitrogen charged packaging.

Figure 1: Upper. Steel shelf with TGY extract being dried in the L-200. Lower. Dried TGY sample exhibiting a porous structure.

4. Conclusion

Freeze-drying is a suitable method to prepare TCM decoctions for a long shelf life and for simple use by rehydration. Here, we successfully dried a human dose of a Tinma Gouteng Yin sample that is reported to have neuroprotective effects in in vitro and in vivo models of Parkinson’s disease.

Thanks to the gentle prepared using the combination of extraction, concentration, and lyophilisation, health beneficial compounds are preserved in the medicine. With the here presented process TCM does are made durable and readily available.

5. References