CADMIUM LEACHING FROM A HOUSEHOLD TREATED CHANTHARELLES AND CADMIUM UPTAKE FROM THE CHANTHARELLES IN A MEAL

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Introduction

Cadmium is highly toxic metallic element that is one of the priority environmental and food contaminants. Edible mushrooms collected from wild are appreciated as organic food because of taste, flavour, texture and also of some nutritional and medicinal value, and good example is *Cantharellus cibarius* Fr. The minerals composition of mushrooms under undisturbed condition in wild can to some degree reflect a geochemical composition of a parent soil. This has been observed for mercury and also silver, cadmium and some other metallic elements but there is no a uniform pattern. There are different receipts for cooking chanterelles (fried with eggs or in other way, sautéed in butter, oil or cream, served as soufflés, cream sauces, soups and pickled). They also can be preserved deep frozen or dried. Fresh chanterelles before frying, pickling etc. have to be blanched (kept for 5 to 15 min in boiled water).

This study examined a fate of cadmium in a chain: fresh – frozen – dried – blanched – pickled and consumed chanterelles in aim to get an insight into its leaching under processing and culinary treatment, and also possible rate of the element absorption in alimentary tract by man in a model system.

Methods

Mushrooms were rinsed with cold tap water and drained. Next, each fruit body in collection from a particular site was sliced into four or three parts (vertical cuts using a plastic knife), which were pooled accordingly. In total, thirty six composite samples were prepared from those mushrooms for experiments. The experiments were performed to examine an impact of processing and culinary treatment on fate of cadmium in chanterelles and its bioaccessibility from the processed (dried, frozen, blanched and pickled) mushrooms.

The bioaccessibility of cadmium from the treated chanterelle was examined using adapted, the *in vitro* model - UBM (Unified Bioaccessibility Method) by BARGE (BARGE/INERIS, 2010). The dried, frozen, blanched and pickled mushrooms were *in vitro* digested in the model juices - gastric juice (fraction F1) and gastro-intestinal juice (fraction F2) mimicking digestion in the human alimentary tract.

Cadmium in fungal materials from all treatments and processes was determined using validated methods by inductively coupled plasma mass spectrometry with dynamic reaction cell (ICP- DRC-MS; ELAN DRC II ICP-MS) or inductively coupled plasma -optical emission spectroscopy (ICP- MS; ICP-OES Agilent 5100 VDV). The fungal materials were wet digested with a solution of concentrated nitric acid in pressurized vessels made of polytetrafluoroethylene (PTFE) with aid of microwaves. In the same way were examined a several certified reference materials of known content of cadmium, and the procedural blanks.

Results

Cadmium content decreased by 11±7 to 36±7% in blanched *C. cibarius* in relation to fresh mushrooms and by 40% when were treated a deep frozen mushrooms. Pickling of the blanched *C. cibarius* decreased

cadmium content by 47 to 70%. Total leaching rate of cadmium from the blanched and pickled *C. cibarius* was 90-91%.

Bioaccessibility of cadmium from untreated *C. cibarius* was from 24±2 to 33±2 % for the gastric fraction (F1) and from 12±3 and 18±3% for the gastro-intestinal fraction (F2). Bioaccessibility of cadmium from deep frozen *C. cibarius* was 27±2% (F1) and 11±2% (F2). In both experiments, the bioaccessibility of cadmium from the uncooked *C. cibarius* was similar for the particular fractions regardless the mushrooms were deep frozen or not. Cadmium contained in the pickled mushrooms, which were fresh when blanched and next pickled, was much better extracted into the gastro-intestinal F2 juice (from 22±13 to 68±18%) than to the gastric F1 juice (from 5.9±2.3 to 19±6%). No cadmium could be detected (limit of detection was 0.03 microgram per liter) in the gastro- and gastro-intestinal juice extracts of the pickled *C. cibarius*, which were deep-frozen before blanching and pickling.

Conclusion

Cadmium is largely lost during blanching and pickling of the *C. cibarius*. Bioaccessibility of cadmium from the pickled *C. cibarius* can be high, while is low from the untreated or blanched fruiting bodies. Is anticipated that bioaccessibility of cadmium contained in processed but not acidified *C. cibarius* will not exceed the figures for the blanched mushrooms in this study.

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References

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