

## Speciation analysis of selenium enriched onions using HPLC-ICP-MS

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Selenium is one of the essential elements for human. The Se-compounds play an important role in antioxidant in human and animal bodies. Some previous studies also reported that Se-compounds such as Se-methyl-selenocysteine (MeSeCys) and selenoneine have the effect to reduce toxicity of methylmercury [e.g., 1]. Insufficient Se intake would lead to several health problems including cardiac failure and muscle weakness. On the other hand, the excess of Se also causes health problems such as gastrointestinal disease. It is well known that toxicity and bioavailability of elements depends on their chemical forms. In the case of Se, inorganic compounds have higher toxicity than organic compounds, and organic compounds have higher bioavailability than inorganic compounds. Thus, it is important to know the chemical forms of Se in food stuff. In this study, we have developed a high-performance liquid chromatography (HPLC)-ICP-MS technique for the speciation analysis of Se. The presented technique was also applied to the Se enriched onions to reveal the chemical forms of Se.

The bulbs, leaves, and roots of onions enriched with Se (IV) or Se (VI) were used as the samples. The samples were dried at 40°C, and then, powdered using agate mortar. The Se compounds were extracted from the samples by pronase treatment. For HPLC-ICP-MS analysis, a C18 reversed-phase column was used to separate six Se compounds including Se (IV), Se (VI), selenocystine (SeCys<sub>2</sub>), MeSeCys,  $\gamma$ -glutamyl-Se-methylselenocysteine ( $\gamma$ -glu-MeSeCys), and selenomethionine (SeMet).

In the case of Se (IV)-enriched onions, organic compounds such as MeSeCys,  $\gamma$ -glu-MeSeCys, and SeMet accounted for more than 60% of total Se in bulbs, leaves, and roots, while Se (IV) accounted for only 10%. Even the roots samples contained significant amount of organic Se compounds, thus, it is considered that metabolism progresses in the onion roots. On the other hand, in the case of Se (VI)-enriched onions, Se (VI) was the most dominant compounds. These results indicate that Se (IV) is easily metabolized to less toxic organic compounds compared to Se (VI).

[1] Y. Yamashita M. Yamashita, *J. Biol. Chem.*, **24** (2010).