Metabolome analysis of Japanese sake

There has been a growing interest in comprehensive metabolite analysis (metabolomics). We applied metabolomics approach to analysis of sake components which affect quality of sake.

After setting analytical methods for profiling sake components using GC-MS, various types of commercial sake were analyzed. As a result of principal component analysis*, ginjo-shu, ko-shu, and the others were separately clustered, which suggested that manufacturing method of sake could be speculated to some extent by metabolome analysis. In addition, collaborating with Osaka university, we carried out sensory evaluation of sake mentioned above and investigated the relationship between sensory scores and components including both volatiles and nonvolatiles. As a result, components related with sensory attributes such as bitterness and aftertaste were found.

* Principal components analysis: a method of multivariate analysis which enables to explain the maximum amount of variance in the data set with the fewest number of uncorrelated variables, “principal components”. 
Metabolome analysis of Japanese sake

Analytical method for volatile components of sake
- Stir bar sorptive extraction (SBSE) - GC-MS ⇒ Non-target analysis
- Solvent extraction - GC-MS ⇒ Analysis of polar components (not extractable by SBSE)

Analysis of various types of sake
- 40 sake samples with different polishing rate and amount of jozo-alcohol
- Principal component analysis with 158 volatile component data

Relationship between components and sensory attributes (collaboration with Osaka university)
- Volatiles (158 components)
- Nonvolatiles (53 components)

Sensory scores

Prediction models for sensory scores were constructed

Manufacturing method can be speculated