

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”.

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Analytical method for volatile components of sake

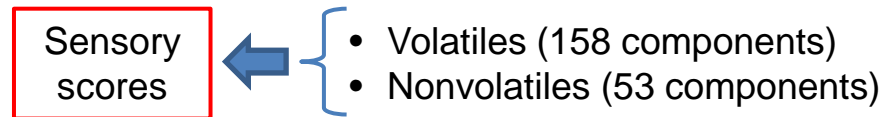
- Stir bar sorptive extraction (SBSE) -GC-MS ⇒ Non-target analysis
 - Solvent extraction-GC-MS ⇒ Analysis of polar components (not extractable by SBSE)
- } About 200 components were identified

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

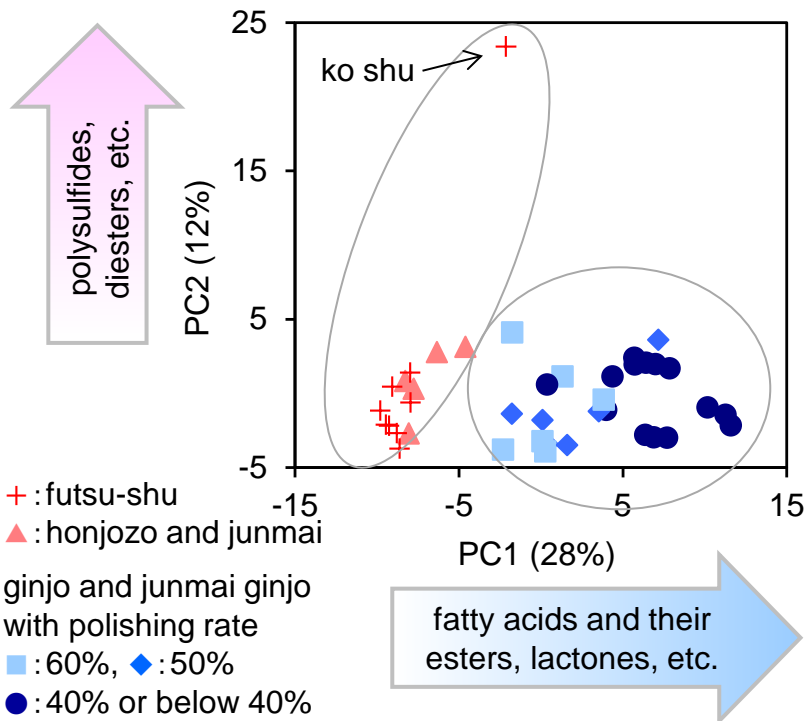
(collaboration with Osaka university)



OPLS regression analysis

attributes	related components
ginjo-ka	fatty acids, fatty acid esters
grassy/aldehydic	acetate esters
sweet aroma/caramel	furfural, methional, DMDS
sulfury	furfural, methional, DMTS
body	ornithine + arginine, 1-octen-3-ol
amakara (dryness)	trehalose, glucose
aftertaste	amino acids
pungent/smoothness	tyrosol, 2-phenylethanol, trehalose
sour	2-phenylethanol, succinic acid
umami	glucose, furfural
bitter	ketones, lactones, fatty acids

Prediction models for sensory scores were constructed



Manufacturing method can be speculated