

## Modification of Beer Character Using Transglucosidase

Transglucosidase (EC3.2.1.20,  $\alpha$ -D-glucoside glucohydrolase, or commonly  $\alpha$ -glucosidase) is an exo- type carbohydrase found widely in nature. Fungal transglucosidase catalyzes two reactions: a transglucosylation reaction that forms panose and isomaltooligosaccharide with  $\alpha$ -1,6 glucosidic linkage and a hydrolysis reaction with maltoligosaccharides containing specifically  $\alpha$ -1,4 glycosidic linkages, panos and isomaltooligosaccharide as substrate and producing glucose. Both reactions can be utilized in brewing and produce beer with different characteristics.

### EXAMPLE 1

Transglucosidase when added to normal brewery wort produces predominantly isomaltose, panose and small amounts of isomaltotriose. The isomaltooligosaccharides produced cannot undergo fermentation by brewer's yeast and the resulting reduction in fermentation decreases the level of alcohol produced; the body, smoothness and general taste perception of the beer is also altered by the presence of the unfermented isomaltooligosaccharides. Alternatively, adding transglucosidase to the mash

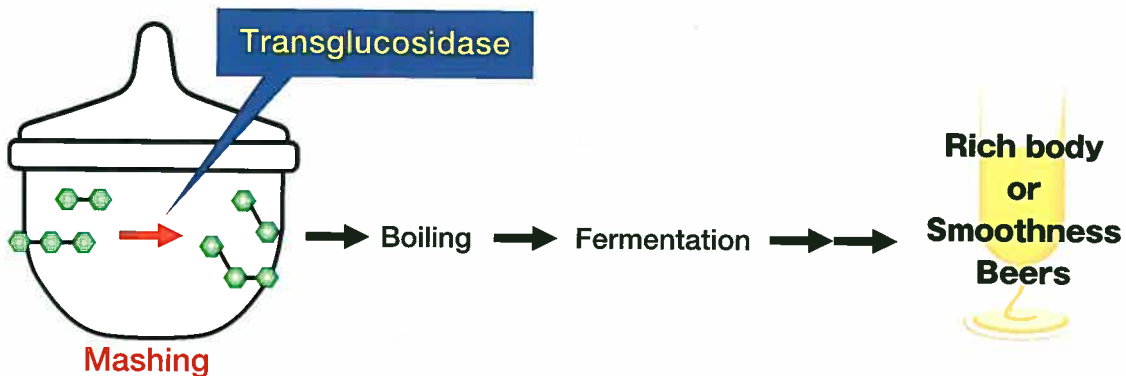
conversion vessel would have the same effect but have the advantage that the enzyme would be heat inactivated during wort boiling.

### EXAMPLE 2

Transglucosidase can also be added during fermentation, but the results are very different from Example 1. Under the conditions of fermentation the hydrolysis reaction of transglucosidase predominates and oligosaccharides are broken down resulting in increased attenuation and alcohol production. For this reason transglucosidase can be used to produce "Lite" (low carbohydrate) or superattenuated beers. The addition of transglucosidase during fermentation has also been used to reduce the production of acetic acid during very high gravity brewing.

Amano Enzyme Inc. currently has food grade fungal transglucosidase available in bulk quantity.

### EXAMPLE 1



### EXAMPLE 2

