

## Inhibitory Effect of Salts on the Formation of Mutagens/Carcinogens from Maillard Reaction

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### Summary

The Maillard reaction is induced when a reducing sugar is reacted with amino compounds under high-temperature conditions, and is an important reaction in the food fields. However, since the Maillard reaction produces mutagen/carcinogens such as acrylamide (AA), heterocyclic amines and 5-hydroxymethylfurfural (HMF), it is required to control the Maillard reaction. In this study, we examined the inhibitory effect of salts on the formation of mutagens/carcinogens from the Maillard reaction.

D-Glucose and L-asparagine were dissolved in phosphate buffer (pH7.4) and salts (NaCl, KCl, MgCl<sub>2</sub>, CaCl<sub>2</sub>) were added. The solutions were heated at 121°C for 60 min to prepare Maillard reaction model solutions. The absorbance (450 nm) of the reaction solution was measured. When salts were added to the Maillard reaction model solution, all salts decreased the absorbance. The formation of AA and HMF in Maillard reaction model solutions were measured using LC-MS/MS. As a result, all salts decreased the formation of AA. Especially, MgCl<sub>2</sub> and CaCl<sub>2</sub> showed the strong inhibitory effects. Hash browns were cooked by adding NaCl. The change of color, the formation of AA and HMF were measured. Hash browns containing NaCl significantly decreased AA formation, while HMF formation unchanged. The mutagenicity of Maillard reaction model solution prepared by adding various salts to D-glucose, L-asparagine, and creatinine and heating at 121°C for 60 min was evaluated using the Ames test. The addition of salts to the Maillard reaction solution inhibited the mutagenicity. The divalent salts showed the strong inhibitory effect. These results suggest that salts have various effects such as inhibition or promotion on the formation of mutagens/carcinogens from Maillard reaction.