

# Umami taste supports salt reduction

~Maintaining good taste  
with umami taste compounds~

**Umami compounds improve  
the taste of low-salt dishes**

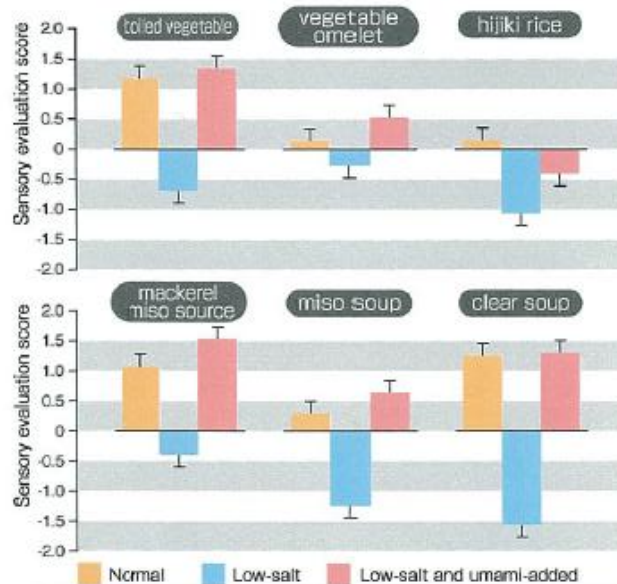
Here we present the efficacy of umami compounds, for improving the acceptability of low-salt dishes. An excessive salt intake can predispose salt-sensitive individuals to hypertension, which is a risk factor for heart diseases and stroke. Patients with renal disease and hypertension are prescribed strict low-salt diets under the supervision of a doctor or nutritionist. But the taste of food declines when the amount of salt is reduced, especially when individuals are adapting to low-salt diets. We introduce practical examples of low-salt dishes supplemented with glutamate alone or glutamate with inosinate and guanylate and assess whether they can improve the palatability of low-salt foods by sensory evaluation.

## Low-salt dishes with umami taste compounds study in Japan 1

### <Boiled vegetables, vegetable omelet, hijiki rice, mackerel miso sauce, miso soup, and clear soup>

Ishida et al. led a sensory evaluation study at Juntendo Koshigaya Hospital on six typical Japanese dishes: Boiled vegetables in Japanese stock and soy sauce [*ohitashi*], vegetable omelet [*chigusa-yaki*], hijiki rice [*hijiki-gohan*], mackerel in miso sauce [*saba-misoni*], miso soup [*miso-shiru*], and clear soup [*sumashi-jiru*]. Thirty-four healthy adult volunteers participated in the sensory evaluation. They were asked to rate palatability, saltiness and overall taste intensity in a seven-point scale of a standard dish (control), low-salt, and low-salt dishes enriched with umami substances (salt reduced by 21-44%). Simple low-salt dishes lose palatability, saltiness and overall taste intensity which increased considerably with the addition of umami compounds. The scores of low-salt dishes with glutamate, inosinate and guanylate were close to the ones of controls. This suggests that the addition of umami substances is effective to improve the flavor of low-salt foods to a similar level of standard foods (Figure 1) and salt could be reduced by as much as 35%.

Figure 1 Sensory evaluation of various dishes (overall taste intensity)



The low-salt umami rich seasonings were prepared as below. Enriched soy sauce: 3.5 g of magnesium glutamate, 0.2 g of sodium inosinate, and 0.02 g of sodium guanylate prepared with 40.9 g of soy sauce and 46.1 g of water. Enrich miso paste: 87 g of miso paste, 12.7 g of magnesium glutamate, 0.29 g of sodium inosinate, and 0.03 g of sodium guanylate.

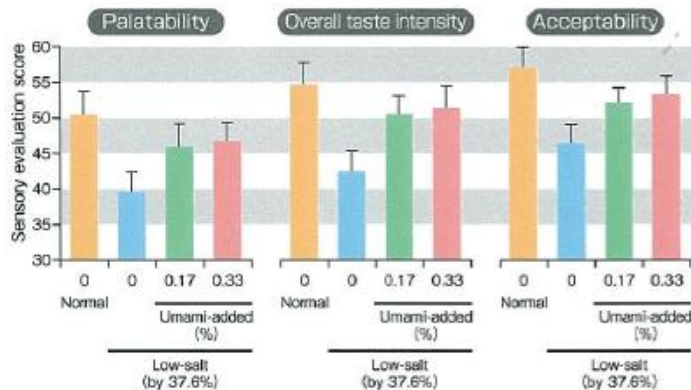
(M. Ishida et al. Journal of Nutritional Science and Vitaminology 64(2011))

## Low-salt dishes with umami taste compounds study in the US 2

### (Chicken broth)

Carter et al. conducted another sensory evaluation study at the University of Washington (Seattle) using four types of chicken broth: standard, low-salt, and low-salt with two concentrations of glutamate. The control or standard broth contained 0.85% of salt and the low salt 0.53%. Calcium glutamate (umami compound) was added at 0.17% and 0.33% respectively. The three low-salt soups had 37.6% less salt than the standard soup. Thirty-four healthy adult volunteers rated the palatability, overall taste intensity and acceptability of the soups using a 100-mm visual analogue scale (VAS). The palatability, overall taste intensity and acceptability of the low-salt soup without glutamate fell; whereas the addition of calcium glutamate recovered all parameters reaching standard soup scores (Figure 2). This suggests that the addition of umami taste compounds in low-salt soups can reduce salt intake by approximately 38% while maintaining palatability, taste and acceptability.

**Figure 2** Results of sensory evaluation using a visual analogue scale on different types of chicken broth

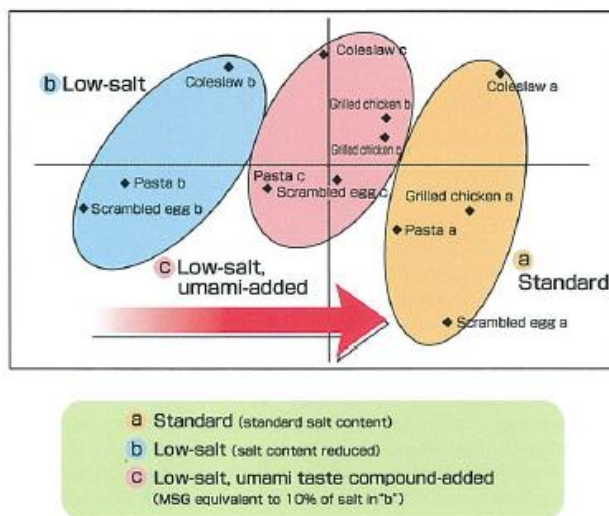


(Carter BE et al. Food Quality and Preference 22(2011))

## < Grilled chicken, coleslaw, scrambled egg, pasta >

Kojima et al. from Kagawa Nutrition University led yet another sensory evaluation study on four dishes with different ingredients and cooking methods (grilled chicken [*Yakitori*], coleslaw, scrambled egg, and pasta). Control dishes were prepared according to the standard salt content while low-salt and low-salt with pure monosodium glutamate (MSG, umami taste compound) had a salt reduction of 33 to 44%. The addition of MSG corresponded to a 10% increase of salt in the low-salt dish. Twenty-two healthy adult volunteers rated saltiness, umami taste, overall taste intensity and overall taste acceptability. According to the principal component analysis, low-salt dishes with MSG were positioned closer to the standard dishes than the low-salt ones without MSG (Figure 3). These results suggest that the addition of MSG improves the taste acceptability of low-salt dishes making their rating closer to standard dishes regardless of ingredients or cooking methods.

**Figure 3** Evaluation of the position of each dish by principal component analysis



※Sensory evaluation is the method that measures the preference attributes of foods according to the human senses which has to be conducted under unbiased conditions (e.g. raters are blinded to the details of food samples).

