

SS01-6 **Physiological roles of glutamate signaling in gut and brain function**

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Gustatory and visceral stimulation of food regulates digestion and nutrient utilization. Free glutamate (Glu) from food induces the umami taste sensation that enhances salivation and swallowing of food, subsequently appetite and palatability of food during meal. Dietary glutamate is catabolized as the main source of energy for the absorption of other nutrients digested in the gut. Therefore, a trace amount of Glu reaches the systemic circulation even after the intake of dietary protein as well as Glu added in foods. We demonstrated a unique gastric sensing system for Glu which is the only amino acid to activate rat gastric vagal afferents from the luminal side possibly via metabotropic Glu receptors (mGluRs) on mucosal cells. A functional MRI (4.7T) analysis revealed that the luminal sensation with 1% Glu at the most preferred concentration in rat stomach activates the medial preoptic area and the dorsomedial hypothalamus, resulting in enhanced thermogenesis and energy expenditure without changes in food intake. Interestingly, rats, fed a high calorie (fat and sugar) diet with free access to 1% Glu and water in choice paradigm, showed lower fat deposition, weight gain and blood leptin, compared with those without Glu (control). From these results, we propose that dietary glutamate functions as a signal is essential for the regulation of normal digestion in the gastrointestinal tract via gut-brain axis, contributing to the maintenance of our healthier life. Adequate glutamate sensing in the oral cavity through digestive tract in elderly with some digestive dysfunctions may ameliorated by their meal with pleasantness as before.