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題名 ; Objective Evaluation of Crispy and Crunchy Textures of Foods by Acoustic Analysis

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Various sensory elements combine in a complex manner to create the deliciousness of foods cooked using edible fats and oils. Textures such as crispness, crunchiness, hardness, softness, and fragility are essential in many foods, especially in deep-fried foods, snacks and baked confectioneries. Each food has a characteristic texture, which is evaluated by sensory tests in general. Although food scientists and engineers have attempted objective evaluations of the characteristic textures of different foods, an optimal method for the texture evaluation is yet to be developed.

Here, we hypothesized that texture can be evaluated based on the sound created during mastication. Because individual differences exist in terms of human mastication sounds, we developed a device mechanically capable of crushing foods. By combining this food crushing device with a method to analyze the crushing sounds, we aimed to construct an objective system for texture evaluation that can replace sensory evaluation tests.

In this study, we evaluated several foods using the developed food crushing device and acoustic analysis. The use of the device facilitated reproducible mechanical crushing of foods. Then, we analyzed the sounds of foods being crushed to determine their physical quantities, such as sound pressure level, and psychoacoustic evaluation quantities, such as loudness and sharpness. Some acoustic analysis results showed good correlation with the sensory evaluation results of texture. In addition, the acoustic analysis results revealed high within-day and between-day reproducibility. Therefore, we propose that the acoustic analysis results could be used as an index for texture evaluation.