

Search for Powdered Natural Foods to Control Oral Biofilm Infections

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Introduction

Prevention of oral infections becomes more important for the coming unprecedented aged society. However, present prophylaxis is not able to perform adequately to the elderly who need long-term care. Therefore, we considered a phytochemical approach to control oral infections by daily diet. In this study, we searched for foods that have antimicrobial properties and pursued their characteristics.

Materials

Samples

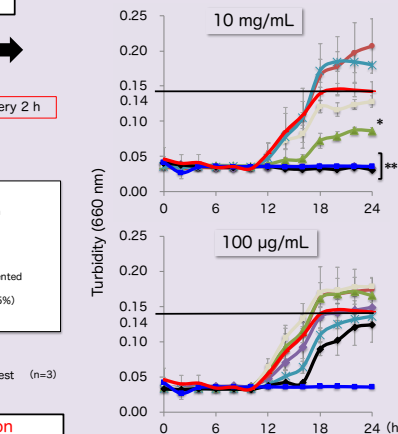
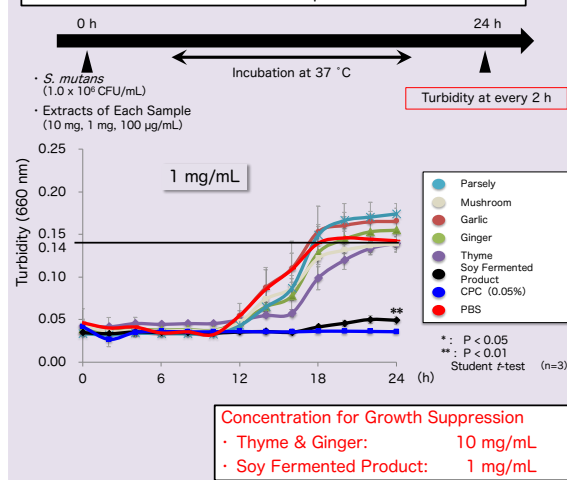
- **Foods:** Powder of Mushrooms, Garlic, Parsley, Thyme, Ginger, Soy Fermented Products
- **Positive Control:** Cetylpyridinium Chloride (CPC) 0.05%; Sigma-Aldrich
- **Negative Control:** Phosphate-buffered Saline (PBS) pH7.4; Gibco

Others

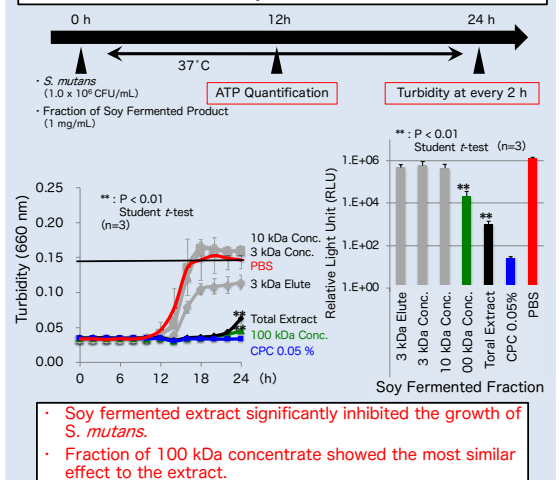
- Bacteria: *Streptococcus mutans* ATCC25175 (Medium: Brain Heart Infusion Liquid)
- Proteases: Thermoase PC10F; Amano Enzyme, Sumizyme FP; Shinnihon Chemicals
- Turbidity Measurement: Spectrophotometer; Hitachi High-Tech Science
- Adenosine Triphosphate (ATP) Measurement: Lucifer HS Kit, Lumitester c-110; Kichoman

Methods & Results

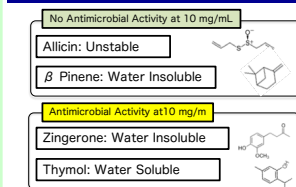
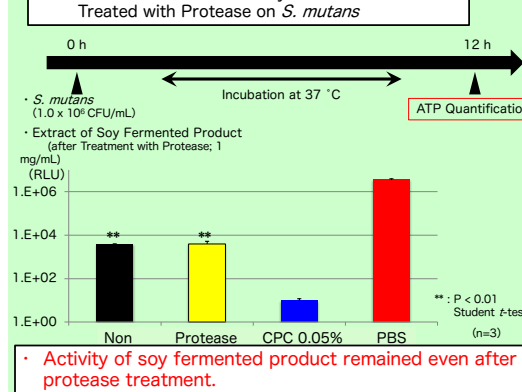
#1 Antibacterial Effect of Each Sample Extract on *S. mutans*



#2 Antimicrobial Effect of Soy Fermented Fraction on *S. mutans*



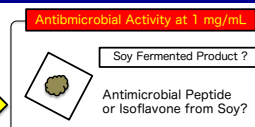
#3 Antimicrobial Effect of Soy Fermented Extract Treated with Protease on *S. mutans*



Garlic, parsley, ginger, and thyme contain antimicrobial substances such as allicin, β Pinene, zingerone, thymol respectively. However, since allicin is unstable and β Pinene is insoluble in water, it is presumed that neither of these methods gave effective concentration and did not show sufficient growth inhibition in this method.

Meanwhile, zingerone and thymol were included in ginger and thyme, and since these are soluble in water, an effective concentration was obtained.

Discussion

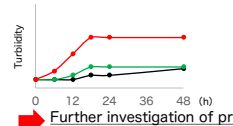


The soy fermented product had a growth suppressing effect at a lower concentration than zingerone and thymol.

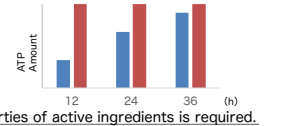
Furthermore, it is conceivable that the active ingredient is not a protein by characteristic investigation.

Test systems with different conditions such as fermentation time, number of doses and so forth have already been performed as follows.
Only schematic images are shown due to patent pending (Japanese Patent Application No. 2017-184274).

Antimicrobial property during fermentation time



Antimicrobial activity at frequent dosing every 12 hours



Further investigation of properties of active ingredients is required.

Conclusion

We discovered that fermented soybean powder can be a functional food suppressing oral bacterial infection.

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