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プラズマ刺激が脂質蓄積酵母*Lipomyces*に与える影響
Effect of plasma stimulation on lipid accumulating yeast *Lipomyces*

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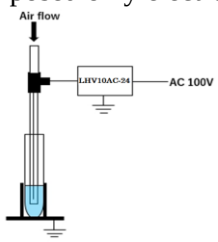
1.Introduction

Various organisms respond to stimuli or stress such as charged species, lights, chemicals, nutrition, pressure, temperature, and heat. The dose of a given stimulus has the potential to lead to activation or proliferation, functional depression, programmed cell death, such as apoptosis and autophagy, or necrosis. Recent progress of plasma biotechnology, plasma treatment affects various organisms such as mammalian cells, microorganisms, and plants dose-dependently, ranging from increasing cell proliferation to the induction of apoptosis.

In this study, we investigated plasma treatments effect on proliferation and growth of cell tissue, of yeast *Lipomyses*, which accumulates triacylglycerols (TAGs) as intracellular fat globules and we confirmed volume augmentation of fat globules.

2.Materials and Methods

Lipomyces starkery CBS 1807^{T} was devolved from the culture collection of Yamanashi University. The yeast was cultured at 28℃ in 100mL of YPD liquid medium (glucose 2%, peptone 0.25%, yeast extract 0.15% , and malt extract 0.15%) using a 500-mL shake flask. After 2 days cultivation, the cell suspension transferred 5 mL to 30-mL test tubes, and it divided into 3 groups. One was unirradiated plasma (Control), The second was irradiated dielectric barrier discharge (hereafter DBD) plasma (Plasma irradiation). The third was exposed only electromagnetic wave of DBD plasma (Electromagnetic wave). After that, 2 mL of the cell suspension was pipetted into 30-mL test tubes, and added 3 mL condensation YM liquid medium (glucose6.7%, peptone0.42%, yeast extract 0.25%, and malt extract) After 6 days cultivation, number of cells and the fat globules volume were calculated.

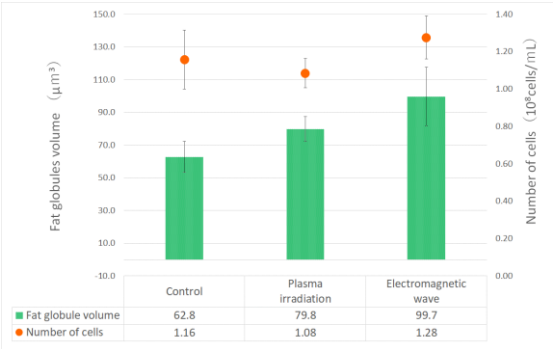


Figre 1. Experimental setup

Figre 1 shows experimental setup that consistsing of quartz tube 3.0 mm and 2.0 mm in outer and inner diameter and a tungsten wire with a diameter of 0.6 mm that was placed in the center of the tube. Clean air was flowed 500 mL per minute through the tube. The tungsten wire was connected to a power source (LHV10AC-24). The applied voltage was 7 kV (18.5 kHz), and applied time was 10 seconds.

3.Experimental Results

As shown in Figre 2, the volume of group fat globules was 1.27 times to that of Plasma irradiation and 1.59 times to that of Electromagnetic waves as compared with the Control. From this, it is possible that not only charged species but also electrical stimulation by plasma is involved in the increase in fat globules volume.



Figre 2. Fat globules volume and number of cells after 6 days. Significant differences were identified using Student's t-test. (*:P<0.05,***:P<0.005)

Reference

1. Satoshi, K. et al (2012)
2. Hashzume, H. et al (2015)
3.Yanagiba, M et al, J. Oleo Sci.68,3,245-249(2019)