
Effects of non-thermal plasma on cell differentiation and protein secretion in *Aspergillus oryzae*

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Filamentous fungi are well known for secreting various kinds of hydrolytic enzymes which have been widely used in biotechnological industry. *Aspergillus oryzae* is a filamentous fungus used in fermentation industry, producing hydrolytic enzymes, such as alpha-amylase, protease, pectinase and beta-galactosidase etc. In this study, we examined the enhancement of spore germination and protein secretion in *A. oryzae* by non-thermal plasma. The fungal spores were treated with a dielectric barrier discharge (DBD) plasma using nitrogen as feeding gas. After the plasma treatment, spore germination was analyzed by colony plate count method. The quantitative polymerase chain reaction was used to analyze expression of the *alpha-amylase* and *protease* genes. Moreover, the activities of alpha-amylase and protease enzymes also analyzed. Results showed that spore germination percentage of *A. oryzae* was slightly increased after nitrogen plasma treatment for 2 and 3 min. Gene expression and activity of alpha-amylase and protease within fungal cell were enhanced after the treatment with nitrogen plasma for 1 and 2 min. We also observed that plasma treatment accelerated the expression of several genes involved in cellular trafficking or secretory pathway. These results suggest that non-thermal plasma can be considered as an alternative method for activating the function of beneficial fungi.

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