Effect of Fermentation on Allergenicity of Egg White Proteins
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Summary
Egg allergy occurs in 0.5% of the population and in around 5% of the children with allergy. It is the second most common food allergy in children beside cow’s milk allergy. The purpose of the study is to ferment egg white to reduce egg allergenicity. Our preliminary results showed that lactic acid bacteria, such as Lactobacillus sakei, Lactobacillus sanfranciscensis, and Lactobacillus delbrueckii subsp. delbrueckii, could grow in egg white. Our next goal is to determine the effects of fermentation on egg white allergenicity and protein profile.

Importance of Egg in Food Industry
In order to prolong the shelf life of eggs and make the transportation more easily, many egg suppliers use spray drying to produce egg white powder, which is an excellent protein source and could provide superb functional properties: emulsion and foaming capacity. More and more food manufacturers choose to use it in their products, such as baked good, sauces, candies, cookies, and creamy fillings.

Project Description
If we can reduce or even eliminate the allergenicity of egg white powders, the food products that contain them would become safer for the egg allergy patients. In other words, various types of food products with egg as an ingredient will have a larger market.

Related researches
Disulfide bonds could strengthen the structure of proteins and make them stable to heat and chemical treatments. Some researchers have reported that thiol metabolism of L. sanfranciscensis contributes to breaking down the disulfide bounds of egg white proteins in sourdough. Soybean is a food allergen that contains abundant proteins. Some researchers ferment soybean with various microorganisms, and the immunoreactivity of soybean proteins has been reduced ranging from 77% to 89% through fermentation. Based on these, we hope to grow bacteria in egg white and reduce its allergenicity during fermentation.

Our Approach
Before spray-drying, fresh egg white would be inoculated with various strains of bacteria.

- Separate egg white and egg yolk in sterile condition
- Mix egg white and maltose solution at the ratio of 9:1
- Mix egg white and tryptone solution at the ratio of 9:1
- Decrease the pH of all the egg white to 5.5 respectively
- Mix bacteria solution and egg white at the ratio of 1:9
- Incubate them at 37°C; detect the pH and bacteria numbers in egg white at 0h, 24hs and 48hs

Our Observations
After inoculated various bacteria separately in different types of egg white solution, we found that three strains can grow well in egg white with tryptone.

Discussion
As these bacteria can grow well in egg white, their thiol metabolism and proteolytic system are potential to modify structures of proteins, which favors the denaturation of the allergenic proteins in egg white. The ultimate purpose of this research is to eliminate the allergenicity of egg white powders.

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