Detection of rice allergens in rice grain and the products containing rice bran

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Aims: Rice allergy is a problem in both Asian and Western countries. Several rice proteins have already been identified as causative agents of rice allergy. Since the first case of occupational contact urticaria was reported in a housewife and was due to the handling of rice bran in the form of rice bran pickles, it is necessary to understand the allergenicity of whole brown rice, not only polished rice but also rice bran, and to consider the sensitization by percutaneous exposure. In this study, we show the distribution of rice allergens in rice grain and the allergenicity in health foods and cosmetics containing rice bran as a constituent.

Methods: Brown rice (Oryza sativa L. cv koshihikari), polished rice, and rice bran were powdered and suspended in 1M NaCl containing protease inhibitors or Laemmli sample buffer and proteins were extracted. For the health foods and cosmetics containing rice bran, samples were suspended in phosphate-buffered saline (PBS) and proteins were extracted. The extracted proteins were separated by sodium dodecyl sulfate-polyacrylamide gel electrophoresis (SDS–PAGE) under reducing conditions, and analysed using western blotting with rabbit polyclonal antibodies specific to rice allergens or plasma from rice allergic patient.

Results: The results of western blot analysis showed that RAG 2 and a 19-kDa globulin were detected in the brown rice and the polished rice, while a 52-kDa globulin was detected in the rice bran and the brown rice. 52-kDa globulins were observed in some of the health foods and cosmetics containing intact rice bran as a constituent. Western blot analysis using a rice bran allergic patient’s plasma showed that around 52-kDa globulin protein was detected as an IgE-binding protein of rice bran and some of the products containing rice bran.

Discussion: Our results indicate that RAG2 and a 19-kDa globulin are localized in polished rice, while a 52-kDa globulin is localized in rice bran. Several products containing intact rice bran as a constituent are found to contain the 52-kDa globulin. Our results suggest that the 52-kDa globulin is the putative causative allergen of rice bran allergy.

Conclusion: We detected the rice allergens in rice grain and the products containing rice bran. Our results indicate that the patients with rice bran allergy need to be careful about using intact rice bran as a constituent of cosmetics or health foods.