The Sensitising Capacity of Intact β-Lactoglobulin Is Reduced by Co-Administration with Digested β-Lactoglobulin

Background: It is generally believed that protein hydrolysis in the gastrointestinal tract decreases the allergenicity of food allergens. However, it remains unknown if specific properties of digestion products determine whether a sensitisation or tolerogenic immune response will develop. We sought to examine the sensitising capacity of the cow’s milk allergen β-lactoglobulin (BLG) and digestion products thereof in a Brown Norway (BN) rat model. Methods: Intact BLG was digested in an in vitro model simulating the gastro-duodenal digestion process and subsequently fractionated by gel permeation chromatography. BN rats were dosed with either PBS, 200 μg of intact BLG, 30 μg of intact BLG, 200 μg of partially digested BLG, 200 μg of digested BLG, or with 200 μg of a fraction of large complexes or a fraction of small complexes. Sera from BN rats were analysed for specific antibodies and avidity was measured. Results: BLG partly resisted the digestion process. However, the BLG molecules that did not survive the digestion process were rapidly broken down to peptides of sizes less than Mr 4,500. Specific antibody responses revealed that both 200 and 30 μg of intact BLG had immunogenic as well as sensitising capacity, while digested BLG could not induce any specific antibodies. Most importantly, while intact BLG showed a significant sensitising capacity when administered alone, this sensitising capacity was significantly reduced when co-administered with digested BLG. Conclusions: Co-immunisation of intact BLG with digested BLG reduces the sensitising capacity of intact BLG, which could result from tolerogenic mechanisms induced by the digestion products.

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