

Allergy to mammal's meat in adult life: immunologic and follow-up study

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Abstract. Allergy to bovine meat and Bovine serum albumin (BSA) is exceptional, especially in the adult life. BSA is considered a minor allergen in cow's milk allergy, but there is little information about this antigen in reactions produced by other beef products as meat.

To our knowledge, evolutive studies of beef's allergic patients have not been reported.

Objective. To present one patient with several allergic reactions (urticaria-angioedema) after eating different mammals' meat.

Methods. The patient underwent allergy testing through skin prick test (SPT), specific IgE detection and SDS-PAGE Immunoblotting and Immunodot inhibition studies. Periodic determinations of specific IgE to meats and epithelia were performed.

Results. Routine studies for chronic urticaria were normal or negative. SPT showed positive responses to pork, cow, rabbit and lamb meat, and dog, pork, sheep and cow epithelia. It was negative to cat, horse, guinea pig, rabbit, lamb, mouse epithelia, mixture of feathers, cow milk, soybean, mustard, mites and chicken meat and *Anisakis simplex*. Intradermal testing to BSA was positive. Determinations of specific IgE were positive to beef meat, lamb meat, pork meat and rabbit meat, dog, cat, cow, sheep and pork dander, cow's milk, and negative to chicken meat.

Immunoblot and immunodot studies showed IgE recognition bands to bovine and lamb meat which were totally inhibited by BSA. A progressive reduction of the total and specific IgE, the latter until its total negativization, has been observed in the following three-year period.

Conclusions. We report a case of IgE-mediated urticaria-angioedema due to BSA hypersensitivity, possibly induced by a subclinical sensitivity to dog and cat epithelium.

The exclusion diet in patients allergic to these foods may be a progressive loss of clinical allergy.

Key words: beef, BSA allergy, urticaria-angioedema.

Beef allergy is unusual, especially in the adult age [1-3] and sometimes, when clinical symptoms are episodic, the identification of food as the responsible agent is very difficult [4]. The role of bovine serum albumine (BSA) in allergy to cow's milk protein is well known [2], but there is little information about this antigen in reactions produced by other beef products as meat, perhaps because BSA is a heat-labile protein [5,6]. Several cases of allergic reactions caused by BSA have been reported in recent years [3,7], but the natural

history of this food allergy in the adult life is not well known.

Material

We present the case of a 51 year-old nonatopic male, who in August 2000 showed four outbreaks of facial angioedema and urticaria, that resolved in a few days with corticosteroids and antihistamines. During this time

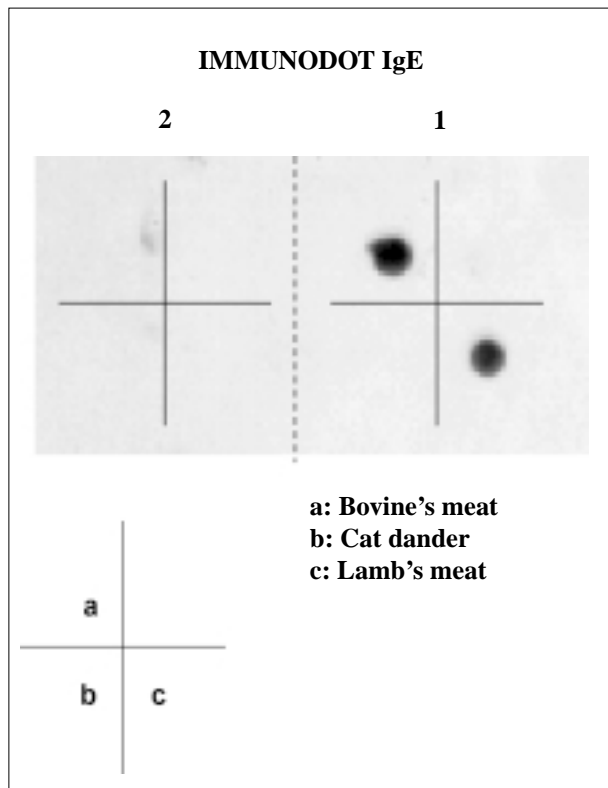


Figure 1. IMMUNODOT IgE. 1. Patient's serum. 2. Patient's serum inhibited by BSA.

he did not appreciate an evident causal relationship with food, insect stings, drugs, physical factors or contact allergens.

Starting in September, the patient suffered two new urticaria outbreaks that broke out immediately after eating sirloin steak and some days later after eating a hamburger made with cow's meat. Between both urticarial episodes, he had not eaten any type of mammal's meat.

At that time he did not have pets at home, although he had a dog and a cat when he was young, that had never lead to breathing or cutaneous-mucous symptoms.

Methods and results

The ordinary analytic study for chronic urticaria including specific IgE to *Ascaris Lumbricoides*, *Echinococcus granulosus* and *Anisakis simplex*, turned out negative or normal.

SPT were positive to beef, pork, lamb and rabbit meat, dog, pig, sheep and cow epithelium, and negative to cat epithelium, horse, guinea pig, lamb, rabbit, mouse, rat, feather mixture, *Anisakis simplex*, mites, soybean, onion, celery, mustard, cow milk, chicken meat and BSA.

Intradermal BSA test (5 mg/ml) was positive (7.5 mm), and it was negative in 5 healthy controls.

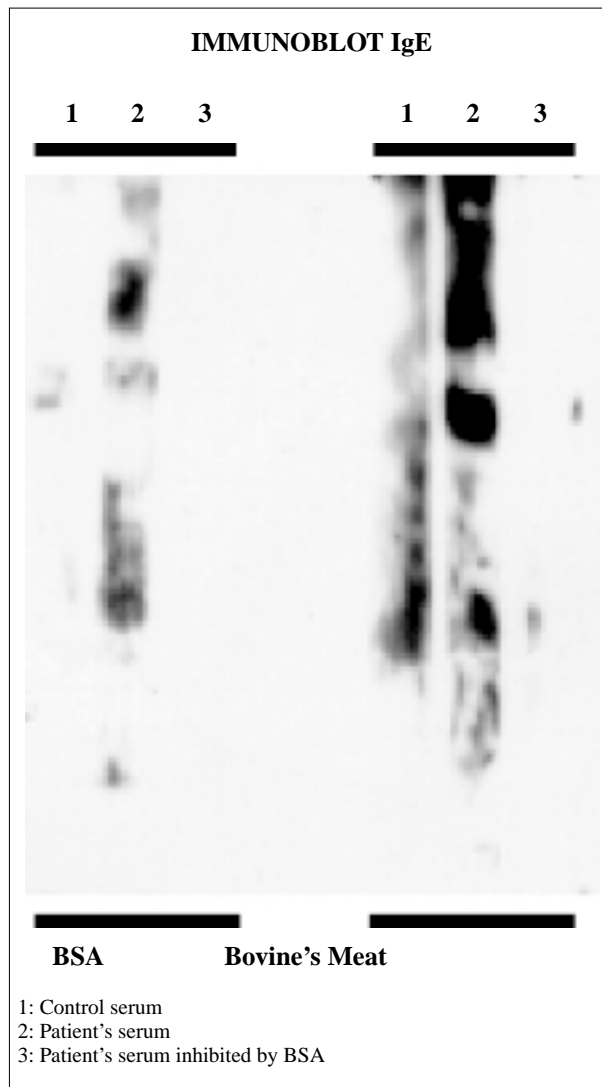


Figure 2. IMMUNOBLOT. 1. Negative Control. 2. Patient serum. 3. Patient serum inhibited by BSA.

Total IgE measured 843 kU/l. Specific IgE (kU/l) was positive to beef meat (21), lamb meat (0.61), pork meat (3.65) and rabbit meat (0.52), dog epithelium (22.2), cat epithelium (39.7), cow epithelium (1.08), sheep epithelium (2.61) and pig epithelium (0.37) and cow milk (1.01), and negative to chicken meat and rabbit epithelia.

An IgE immunodot was positive to bovine's and lamb's meat (Fig.1). Both extracts were inhibited by soluble BSA. Immunoblot IgE was positive to BSA and bovine's meat and was again inhibited by soluble BSA (Fig.2).

Follow-up

A meat-free diet was recommended, with the exception of poultry. Four months later he had two new

Table 1. Skin tests and total and specific IgE values in 2000, 2002 and 2003.

Allergen	Skin test	2000	2002	2003
BSA	Positive	<0.35 kU/l	<0.35 kU/l	<0.35 kU/l
Rabbit meat	Positive	0.52 kU/l	<0.35 kU/l	< 0.35 kU/l
Beef meat	Positive	21 kU/l	2.44 kU/l	<0.35 kU/l
Lamb meat	Positive	0.61 kU/l	0.54 kU/l	<0.35 kU/l
Pork meat	Positive	3.65 kU/l	2.15 kU/l	<0.35 kU/l
Cow milk	Negative	1.01 kU/l	0.49 kU/l	<0.35 kU/l
Rabbit Epithelium	Negative	<0.35 kU/l	<0.35 kU/l	<0.35 kU/l
Sheep Epithelium	Positive	2.61 kU/l	1.68 kU/l	<0.35 kU/l
Horse dander	Negative	<0.35 kU/l	<0.35 kU/l	<0.35 kU/l
Cow dander	Positive	1.08 kU/l	<0.35 kU/l	<0.35 kU/l
Cat dander	Negative	39.7 kU/l	4.62 kU/l	0.42 kU/l
Dog epithelium	Positive	22.2 kU/l	5.51 kU/l	0.36 kU/l
Total IgE		843 kU/l	225 kU/l	97.60 kU/l

episodes after eating lamb and pork sausage respectively. He usually had milk and poultry products with good tolerance. A progressive reduction of the total and specific IgE, the latter until its total negativization, was observed in the following three-year period (Table 1).

After three years the patient introduced cooked pig and lamb meat with good tolerance.

Discussion

The BSA is a thermolabile protein, of approximately 68 kDa [1,5,6,8], which performs a well known role in some cases of food hypersensitivity reactions, and although it is considered of small clinical value, the allergy to this protein can have serious consequences [8]. Even though similar albumins can be found in mammal's meat, cow milk, eggs and pets epithelium [1], there are very scarce allergic reactions to beef proteins, specially in adults [1].

The BSA is considered responsible for the cross-reactivity between different types of mammal products [1,7-10], thus, the IgE antibodies of patients allergic to animals frequently identify the albumins of other species. It also seems responsible for the cross-reactivity among epitheliums of different animals, between animal epithelium and its meat, and between certain epitheliums and different mammal's meat [9].

Our patient has clinical allergy to different mammal's

meat, but only presented subclinical sensitivity to dog and cat epitheliums, which could have been the determinant factors in the subsequent food allergy. The "in vitro" study suggests that the urticarial reactions were caused by allergy to BSA.

This protein has been described as one of the most important allergens present in bovine meat, together with bovine gamma globulin (BGG). Different studies have shown that the reactivity and allergenicity of BSA is modified when beef proteins are heat-processed [2,5,6,11,12]. Werfel et al [2] reported that patients sensitized to heat-labile proteins might tolerate well-cooked meat, while patients with specific IgE to heat-resistant proteins tolerate neither raw nor well-cooked meat. Restani et al. reported that the strained and freeze dried beef are better tolerated by allergic subjects than regular processed meat [6]. For all these reasons, meat allergy is not easily suspected in many allergic patients, as it happened with our patient and other sensitized subjects [4].

Previous reports showed that fish allergy is common in children and young adults, while meat allergy is rarely described [1,2,4,12] especially in the adult life. In our case, the age of the clinical onset (mature age) is of interest and the observation of the dramatic decrease in specific IgE upon meat avoidance as well as the ulterior tolerance of well cooked meats. In a recent study, Fuentes et al [12], described an adult patient who was allergic to undercooked and well cooked meat. The serum recognized a protein band with a molecular

weight of 17 kDa. This protein is heat-resistant and could correspond to myoglobin. This feature suggests that patients allergic to this protein should not tolerate undercooked or even cooked meat. In our patient the fact that the elimination diet was followed by resolution of symptoms and later tolerance of cooked meats and the results of the allergy study are evidences of the role of BSA in this case.

In conclusion, we present an urticaria and angioedema after mammal's meat due to BSA hypersensitivity. BSA should be considered as a panallergen in allergy to mammal's meat and epithelium. In some cases of allergy to meat, as in our patient, the exclusion diet may be followed by a progressive loss of clinical allergy.

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