



## Oral Immunotherapy in an Adult with Cow's Milk Allergy

Cosmin Boteanu<sup>1</sup>, Calle Puerto de Maspalomas<sup>2\*</sup>, María del Mar Reaño Martos<sup>1</sup>, Esther Lourdes Pérez González<sup>1</sup>, Alexandra Maria Yago Meniz<sup>1</sup>, Alfredo Iglesias Cadarso<sup>1</sup> and Matilde Rodríguez Mosquera<sup>1</sup>

<sup>1</sup>Department of Allergy and Immunology, Hospital "Puerta de Hierro" Majadahonda, Spain

<sup>2</sup>Department of Allergy and Immunology, Hospital "Central de la Cruz Roja San Jose y Santa Adela", Spain

### Abstract

**Background:** Cow's milk allergy is the most common food allergy in infants and young children. Oral immunotherapy with food (OIT) is a therapeutic possibility to induce tolerance.

**Case Presentation:** We report a case of desensitization to cow's milk proteins in a 36-year-old patient diagnosed in childhood with allergy to cow's milk proteins.

**Results:** We performed an allergy study with skin-prick tests (DIATER Madrid-Spain) and specific IgE (Cap System, Phadia, Uppsala, Sweden) with: cow's milk, alpha-lactalbumin, beta-lactoglobulin, Casein, sheep's milk, goat's milk with positive results. The patient gave his informed consent and we performed the OIT with cow's milk following our protocol. The patient finally tolerated 200 mL of cow's milk daily.

**Conclusions:** Although the persistence of allergy to cow's milk protein in adults is rare, the OIT could be a good option in the treatment of these patients, improving the security and the quality of life of the patients and their families.

**Keywords:** Cow's milk allergy; Oral immunotherapy; Adult; Food allergy; Treatment

### Introduction

Food allergy affects 2-3% of adults and 6% of children [1]. Cow's milk allergy is the most common food allergy in infants and young children affecting 2-3% of the general population [2]. The prevalence is less than 1% in 6 year-old children or older [3]. Most children outgrow their allergy by age 3 years [4]. However there are studies with worse percentages of tolerance. Saarinen et al found about 11% of children with previously IgE-mediated cow's milk allergy to have persistent sensitivity at age 8.6 years [5].

The only treatment for food allergy is strict avoidance of the food and use of an epinephrine injector if needed. Oral immunotherapy with food (OIT) is a therapeutic possibility to induce tolerance [6]. The first case of successful oral immunotherapy was described in 1908 in a male with egg anaphylaxis [7].

A Cochrane meta-analysis revising controlled studies of OIT in cow's milk allergy concluded that oral immunotherapy is effective in desensitization of most pediatric patients with IgE-mediated allergy [8].

There are few studies on milk desensitization in adults those studies presents the results in a global manner (groups that includes adults and children) [9,10]. In the study of Levy and al. [9] there are adults that tolerated full dose as well as adults that did not achieve full tolerance.

We present a case of desensitization to cow's milk proteins in an adult patient. The OIT could improve the quality of life of the patients and their families.

### Case Presentation

We report the case of a 36-year-old patient with a history of allergic asthma due to pollen sensitization (*Olea europea* and *Cupressus arizonica*) diagnosed in childhood with allergy to cow's milk proteins. He was breast-fed until 1 month of age. When introducing a cow's milk formula he developed vomiting food refusal and 5-6 stools a day some of them bloody. An upper gastrointestinal transit discarded hiatal hernia and hypertrophic pyloric stenosis.

At 4 months years old serum specific IgE for cow's milk proteins was negative. Then a cow's

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#### \*Correspondence:

Calle Puerto de Maspalomas,  
Department of Allergy and Immunology,  
Hospital "Central de la Cruz Roja San  
Jose y Santa Adela", 1, 6º 5, Madrid  
28029 Madrid, Spain,  
E-mail: [cosbote@yahoo.com](mailto:cosbote@yahoo.com)

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**Table 1:** He underwent an allergy study in our department.

SPT (Diater®, Madrid-Spain)	Results
Cow's milk	10x5 mm
Alpha-lactalbumin	14x9 mm
Beta-lactoglobulin	10x11 mm
Casein	16x11 mm
Sheep's milk	12x12 mm
Goat's milk	14x10 mm
Histamine	7x7 mm
SSF	negative

**Table 2:** He underwent an allergy study in our department.

Specific IgE (Cap System®, Phadia, Uppsala, Sweden)	Results
Alpha-lactalbumin	0.43 kU/L
Beta-lactoglobulin	1.13 kU/L
Casein	2.58 kU/L
Cow's milk	4.27 kU/L
Sheep's milk	2.85 kU/L
Goat's milk	3.16 kU/L
Total	12.4 kU/L

milk provocation test (CPT) was performed with a positive result: 30 minutes from the beginning he presented vomiting. A cow's milk and derivatives free diet was recommended.

Skin prick-tests (SPT) to cow's milk proteins (beta-lactoglobulin alpha-lactalbumin casein serum albumin) and CPT performed one year later were positive: 45 minutes from the onset the patient presented hives itching and sneezing. An annual follow-up with skin tests and specific IgE was conducted for 14 years remaining positive.

The patient first came to our allergy department with 36 years of age. He was in a strict free cow's milk protein diet despite which he had suffered several episodes of labial angioedema maculopapular lesions perioral itching and dyspnea all related with the intake of foods containing traces of cow's milk some of them in the last 6 months before attending our outpatient clinic. Once requiring treatment with intramuscular epinephrine. He underwent an allergy study in our department (Table 1 and 2).

The patient gave his informed consent and we began the OIT with cow's milk following our protocol as seen below (Table 3). Patient was premedicated with: ebastine 10 mg (1 hour before) and budesonide 160 mcg/formoterol 4.5 mcg turbuhaler (1/12 hours daily).

Before starting the OIT an endpoint titration prick-test with cow's milk was performed using dilution 1/10000, 1/1000, 1/100: 1/10000: 2x2 mm 1/1000: 5x5 mm 1/100: 6x6 mm Histamine 5x5 mm SSF NEG.

According to our protocol we did not perform a cow's milk provocation test before starting the OIT because the patient has presented several allergic reactions some of them severe after accidental exposures in the last 6 months (Table 3).

The first six visits were twice a week and then weekly. The dose was increased only in the allergy department and then maintained daily at home. As seen in the table when the patients received several doses in one day the interval between doses was 60 minutes.

**Table 3:** According to our protocol, we did not perform a cow's milk provocation test before starting the OIT because the patient has presented several allergic reactions, some of them severe, after accidental exposures in the last 6 months.

Visit	Dilution	Dose (mL)/mg CMP	Interval
1	1/100	0.5/0.16	60 minutes
	1/100	1/0.32	60 minutes
	1/100	2/0.64	60 minutes
2	1/100	5/1.6	120 minutes
	1/100	5/1.6	60 minutes
	1/100	10/3.2	60 minutes
3	1/100	15/4.8	60 minutes
	1/100	20/6.4	120 minutes
	1/100	20/6.4	60 minutes
4	1/100	30/9.6	60 minutes
	1/100	35/11.2	60 minutes
	1/100	40/12.8	120 minutes
5	1/50	20/12.8	60 minutes
	1/50	50/32	60 minutes
	1/50	75/48	60 minutes
6	1/50	100/64	120 minutes
	1/20	40/64	60 minutes
	1/20	60/96	60 minutes
7	1/20	80/128	60 minutes
	1/20	100/160	120 minutes
	1/1	5/160	60 minutes
8	1/1	10/320	120 minutes
	1/1	15/480	120 minutes
	1/1	20/640	120 minutes
9	1/1	30/960	120 minutes
	1/1	40/1280	120 minutes
	1/1	50/1600	120 minutes
10	1/1	75/2400	120 minutes
	1/1	100/3200	120 minutes
	1/1	125/4000	120 minutes
11	1/1	150/4800	120 minutes
	1/1	175/5600	120 minutes
	1/1	200/6400	120 minutes

CMP= cow's milk protein.

In every visit after the last dose the patient stayed 120 minutes in the clinic. The patient referred some days with the doses of 50 mL, 75 mL and 100 mL isolated nonspecific abdominal discomfort that disappeared without medication or dose changes.

Build-up phase of OIT ends after administration of 200 ml of cow's milk / day without premedication. The patient was advised to avoid milk and dairy from other animals (goat, sheep) because of positive skin-testing and serum specific IgE. Three months after finishing the build-up phase of OIT, in the context of acute gastroenteritis and exercise, the patient presented 30 minutes after the daily dose of 200 ml facial erythema and edema, palpebral angioedema, cutaneous pruritus, and dyspnea. Evaluated in our department, symptoms resolved in about 30 minutes after treatment with ephedrine metilprednisolone and dexchlorpheniramine.

**Table 4:** According to our protocol, we performed SPT after the end of build-up phase.

SPT (Diater®. Madrid-Spain)	Results
Cow's milk	5x4 mm
Alpha-lactalbumin	10x9 mm
Beta-lactoglobulin	8x6 mm
Casein	15x12 mm
Sheep's milk	5x4 mm
Goat's milk	negative
Histamine	8x7 mm
SSF	negative

**Table 5:** We also measured specific IgE 1 and 3 months after the end of build-up phase.

Specific IgE	Results (month 1)	Results (month 3)
Alpha-lactalbumin	3.96 kU/L	2.50 kU/L
Beta-lactoglobulin	3.80 kU/L	2.66 kU/L
Casein	5.12 kU/L	4.46 kU/L
Cow's milk	10.6 kU/L	8.28 kU/L
Sheep's milk	8.32 kU/L	6.28 kU/L
Goat's milk	6.13 kU/L	5.45 kU/L
Total	34.7 kU/L	24.6 kU/L

The following day the patient tolerated 100 mL in our department and then we recommended him to continue with this dose daily at home and to come to our department 4 days later or before if an adverse reaction occurred. Five days after the reaction the patient came to our department and told us that he had decided on his own to increase the dose up to 200 mL without any symptoms. He is up to now tolerating 200 mL everyday.

According to our protocol we performed SPT after the end of build-up phase (Table 4). We also measured specific IgE 1 and 3 months after the end of build-up phase (Table 5).

We present a case of desensitization to cow's milk proteins in an adult patient. This procedure is used successfully in children but not many cases are reported in adults. Although the persistence of allergy to cow's milk protein in adults is rare the OIT could be a good option in the treatment of these patients could improve the quality of life of the patients and their families.

More studies are needed before including OIT in routine clinical practice both in children and adults.

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