

# The First Register in Europe of Allergic Urticaria and Anaphylaxis Caused by Erythritol

## Case Report

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### Abstract—The First Register in Europe of Allergic Urticaria and Anaphylaxis Caused by Erythritol

We present the case of a 61-year-old woman with anaphylaxis after ingesting ice creams containing erythritol as a sweetener. After a detailed study of the ingredients of the ice cream after each episode, the only component in common was erythritol. This sweetener has recently been used in Europe as an artificial additive in many types of food and drink, mainly because it does not contain calories. Therefore, food and drink additives should be included in the differential diagnosis of food allergic reactions. This is the first record of an allergic reaction caused by erythritol in Europe.

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**Keywords**—anaphylaxis, erythritol, food sweeteners

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### Resumen— Primer Registro en Europa de Urticaria Alérgica y Anafilaxia Causada por Eritritol

Presentamos el caso de una mujer de 61 años con anafilaxia tras ingerir helados que contenían eritritol como edulcorante. Después de un estudio detallado de los ingredientes del helado después de cada episodio, el único componente en común fue el eritritol. Este edulcorante se ha utilizado recientemente en Europa como aditivo artificial en muchos tipos de alimentos y bebidas, principalmente porque no contiene calorías. Por lo tanto, los aditivos de alimentos y bebidas deben incluirse en el diagnóstico diferencial de las reacciones alérgicas a los alimentos. Este es el primer registro de una reacción alérgica causada por eritritol en Europa.

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**Palabras clave**—anafilaxia, eritritol, edulcorantes alimentarios

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## INTRODUCTION

Hino *et al.*<sup>1</sup> reported allergic reactions caused by food additives such as aspartame, stevia, annatto dye and cycramine acid. Hypersensitivity and anaphylactoid reactions to mannitol are described.<sup>2</sup> Erythritol has recently been used as an artificial sweetener because it is calorie-free and offers interesting textures for pastry, was approved as a food additive in Japan in 1990 and in Europe in 2003. In Spain, erythritol is named eritriol or eritritol and has the additive code E968, which is equivalent to the International Numbering System of Food Additives (INS) 968. In Europe, no cases of allergic reactions by erythritol have been recorded. However, in Japan, where it has been used for thirty years, various cases of urticaria and allergic anaphylaxis have been reported.<sup>1,3-7</sup> The estimated prevalence is <1 per million people.<sup>3</sup> This case, the first in Europe, is described to report the unusual but possible anaphylactic reaction of some food additives (sweeteners).

## CASE REPORT

We present the case of a healthy 61-year-old woman, resident in Castelló de la Plana (Spain), with no previous medical or surgical history. No regular drug treatment and no known previous allergic reactions.

In February 2014, the patient attended a hospital emergency department for a skin reaction with generalized erythema, perioral and lingual edema, urticaria on the torso and upper limbs. The patient reported having noticed the effects shortly after eating an "ice cream and champagne sorbet". She was treated with endovenous Methylprednisolone 60mg, Dexchlorpheniramine 10mg and Ranitidine 150mg with subsequent resolution of symptoms. The patient was followed up after this first episode. In an interview, the patient provided details on all the food consumed at the dinner. Data on multi-ingredient products (ice creams, prawn cocktails, etc.) were studied to establish a clear identification of the various components. All ingredients were recorded in a database. As relevant data, during the interview the patient reported that she suffered urticarial reactions on areas of her skin in contact with very cold water.

Five months later, the patient presented similar but milder symptoms after having consumed sugar-free gum. She again improved after the administration of the injected Methylprednisolone. When ingredients contained in the gum were compared with those recorded in the first episode, those that were present in both were reduced to a list of three sweeteners: maltitol (E965); erythritol (E968) and sucralose (E955). From that moment on, the patient avoided consuming any substance with added sweeteners.

Five years later, few seconds after eating two teaspoons of lactose-free chocolate ice cream, she developed anaphylaxis together with cutaneous flushing, urticaria, respiratory distress, tachycardia, and hypotension. She was treated urgently by administering 1mg of intramuscular Adrenaline. Once in the emergency department she continued the administration of Actocortin, Dexchlorpheniramine, Methylprednisolone and nebulization with Salbutamol. She was admitted to the hospital ward to control her symptoms. Upon discharge, she was prescribed self-injectable adrenaline. An analysis of the ice cream did not match any of the suspected ingredients or any of those listed in the full database. She interviewed the owner of the artisan workshop that made ice cream. He reported that just prior to making the chocolate ice cream that she had eaten, he had prepared a batch of vegan chocolate ice cream in the same container that had included maltitol (E965) and erythritol (E968) as ingredients. During subsequent follow-up, maltitol (E965) was ruled out since the patient habitually consumed it in different foods. This process led to the conclusion that erythritol (E968) was the cause of the allergic reaction, through contamination of the ice cream with erythritol (E968) during its manufacturing process.

## DISCUSSION

Erythritol (1, 2, 3, 4-butanetetrol) is a type of sugar alcohol; it is soluble in water has a molecular weight of 122; is twice as sweet as cane sugar; and has no calories.<sup>1</sup>

Because of its good solubility, it is easily used in various foods and drinks. Yunginger *et al.* say that in Japan more than 125 million people consume more than 5 billion servings of erythritol sweetened foods annually,<sup>3</sup> but admitted that their own data suggests that erythritol might function as an allergen cause of anaphylactic reactions, although the pathophysiological mechanisms underlying these reactions remain unknown.

The estimated prevalence is <1 per million people.<sup>3</sup> In Japan various cases of allergic reactions to erythritol have been reported.<sup>1,3-7</sup> In Europe (2003) it was approved as a food additive thirteen years later than in Japan (1990) and its use is not so widespread, perhaps due to its cost, although in recent years its use has increased significantly. This could lead to more cases of erythritol allergies in the future.

The traditional skin testing system does not always clarify the diagnosis.<sup>3,4</sup> Patients often refused oral challenge feedings because of the severity of their prior systemic reactions.<sup>3</sup> Previous research into the components of the food that patients indicate as the cause of the allergy is essential to ascertain the product that causes it, as has been done in documented cases.<sup>5</sup>

Diligent research into the products consumed (and their ingredients) by patients is the only way to deal with new or rare cases that obviously cannot be diagnosed by routinely applying a puncture test with known and more common allergies. It is important, when faced with an unusual case, to ensure

that the investigation begins from the first episode, including a reconstruction of all the elements that could be factors in the allergic reaction. Waiting for the second episode complicates the possibility of finding the cause.

Sugiura et al<sup>8</sup> reported that although a girl who had experienced many episodes of anaphylaxis diagnosed as being due to erythritol had been desensitized after two years of oral immunotherapy, immunologic tolerance was not achieved. However, Sreenath et al<sup>9</sup> are optimistic about obtaining an antibody specific to erythritol in the future.

As a limitation, it should be noted that the patient has a history of erythema on contact with very cold water. With the exception of chewing gum, the two most serious episodes of allergy to erythritol occurred when it was a component of ice cream. It remains to be clarified whether in certain predisposed individuals, the temperature at which erythritol is ingested could aggravate symptoms.

## CONCLUSIONS

Erythritol anaphylaxis is very rare with an incidence of less than 1 case per million people. However, given the exponential increase in recent years of this additive in different food preparations, it is important to keep it in mind as a possible food allergen.

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